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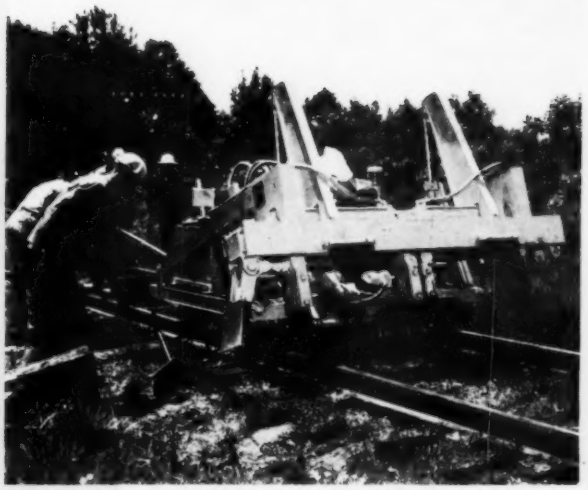

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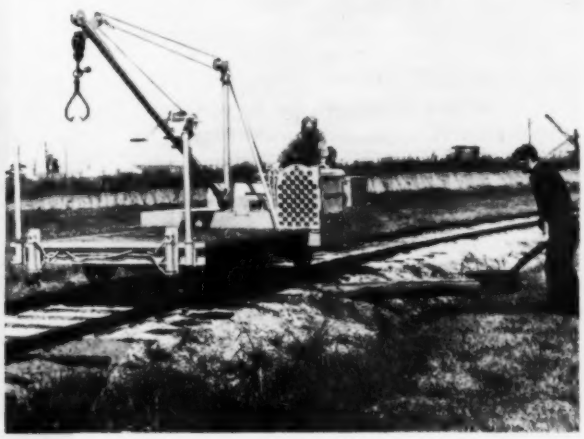

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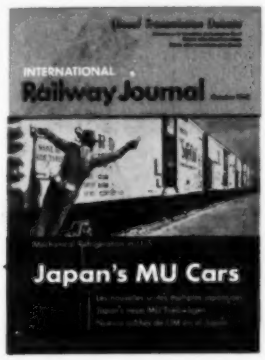

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WORLD REPORT

JAPAN: Japanese National Railways have announced a five-year railway development program expected to cost 975,000 million yen ($2745 million U.S.). The program calls for the electrification of approximately 1800 km of line on various routes and the purchase of 2200 electric railcars at a cost of 133,000 million yen; 255,600 million yen for double-tracking of 1100 km; and the purchase of 500 diesel locomotives and 1800 diesel railcars to modernize steam-worked lines, at a cost of 58,800 million yen. Also included in the program are 21,000 new freight cars and an additional 1000 electric cars for presently-electrified suburban lines. JNR visualizes increases of 31 per cent in passenger and 21 per cent in freight traffic during the five-year period.

RHODESIA: Rhodesian Railways have established a health and industrial section under the supervision of the chief medical officer. All pest control, health, and industrial safety functions, formerly handled by a number of different administrative departments, will be combined in the medical department.

FRANCE: French National Railways (SNCF) and the City of Paris will join to sponsor the construction of a 50-story office building—reported to be Paris' first true skyscraper—and six 18-story apartment buildings on the site of the SNCF's Montparnasse railroad station, which will be replaced by a new consolidated station to be built on the periphery of the 50-acre project.

GREAT BRITAIN: The "Road-Railer," described by British Railways as "a revolutionary form of transport," was publicly demonstrated for the first time at Marylebone Station in London on September 6. The "Road-Railer" is in essence a standard highway semi-trailer fitted with retractable rail wheels; transfer from rail to road and vice versa can be accomplished in two minutes. British Railways are now conducting a survey to determine the number of units required. The "Road-Railer," manufactured by Pressed Steel Company, is substantially similar to the "Railvan" developed by the Chesapeake and Ohio Railway in the United States.

EGYPT (UAR): Hitachi, Ltd. is negotiating with Egyptian authorities for the establishment of a factory for the manufacture of railway equipment in Cairo. Initial plans reportedly call for a plant to assemble equipment manufactured in Japan; full-scale manufacture is contemplated for the future. Hitachi established a branch office in Cairo last year, and is currently building 350 diesel railcars for the Egyptian railway system. Egypt's only domestic railway supplier at present is the SEMAF freight-car plant.

INDIA: The Third Five-Year Economic Development Plan, recently announced and scheduled to begin April 1, 1961, contemplates a 15 per cent increase in passenger train miles, from 124 million in 1960-61 to 143 million in 1965-66, and a 45 per cent increase in rail freight traffic from 162 million to 235 million tons. Steam and diesel locomotive production is to be increased 29 per cent, to 1609 units during the third plan from 1250 units during the second plan. 1900 km of new line are to be built, and nearly 1300 km of existing line electrified. In addition to steam and diesel locomotives, 232 electric-locomotives are to be produced. Total cost for the transportation and communications section of the plan is expected to be 1450 Rupees crores ($3045 million U.S.). Meanwhile, India secured a World Bank loan equivalent to $70 million U.S. to meet foreign exchange needs for railway purchases during the final year of the Second Five-Year plan.

ALGERIA: Plans have been announced for the construction of a 95-km railroad connection between Bir El Atar near Djebel Onk and Tebessa. The new line will provide transportation for a new phosphate-production project at Djebel Onk.

SWEDEN: Ore-carrying capacity of the state rail line connecting the Lapland iron-mining area with the Baltic seaport of Lulea is to be increased to approximately 8 million tons of ore annually. The increase in capacity will be undertaken in connection with plans of Sweden's largerst iron-ore producer and exporter, Luossavaara-Kiirunavaara AB (LKAB) to build a 150-million-crown modern harbor at Lulea. The harbor project, believed to involve the largest capital investment ever made in a single phase of harbor expansion, is expected to be completed by 1964.

ARGENTINA: An Executive decree has approved a five-point emergency rehabilitation program for Argentina's state railway system. The 25,000 million peso ($320 million U.S.) program is to begin in the final quarter of 1960, and is tentatively expected to take 3 to 4 years for completion. Projected expenditures include 2800 million pesos for repair and rebuilding of 8000 freight cars; 800 million for rehabilitation of 800 passenger cars; 2600 km of initial track renovation costing 10,700 million; 300 million for modernization of the Rosario marshalling yards; and 10,000 million for the purchase of new rolling stock and physical plant (see World Market, p. 17). Concurrently the Argentine treasury was directed to place 815 million pesos at the disposal of the state railways for national-currency expenditures during the remainder of the 1960 fiscal year.

(Continued on page 10)

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SYRIA, JORDAN, SAUDI ARABIA: The rehabilitation of the Hedjaz Railway—the "Pilgrim's Line" from Damascus to Medina—has moved nearer to realization following agreement between representatives of these three nations on the manner of paying for the necessary labor and costs involved. The three governments represented in the Executive Committee for the Recommissioning of the Hedjaz Railway, headquartered in Damascus, have agreed to pay the wages of labor and work costs directly, and the cost of materials and equipment in short-term installments. The Commission has now called for bids covering reconstruction and rehabilitation of the 844 km between Ma'an, in Jordan, and Medina Al-Munawara in Saudi Arabia. This portion of the line has lain derelict since World War I, following its destruction by British forces under the command of Colonel T. E. Lawrence. The commission also advertised for bids from consulting engineering firms to supervise the repairs. Letters of intent to bid were requested before September 25.

GREAT BRITAIN: Minister of Transport Marples, officially opening the new £18 million electrified main line between Manchester and Crewe (first stage of the British Railways London Midland Region program for the industrial-frequency 25-kilovolt electrification of its main lines between Manchester, Liverpool and London at a total cost of over £150 million), commented: "We may have a nostalgic yearning for steam, but it is on the way out. The quicker it is out the better. Electricity and diesels are on the way in and the quicker they are in the better."

VENEZUELA: Preliminary studies for the projected 360-kilometer Guanta-Matanzas railway were concluded in late summer, according to reports from Caracas. The line, which it is estimated will cost in the neighborhood of 207 million Bolivares ($62 million U.S.) would connect the Guanta-Puerto La Cruz area on the north coast with the Puerto Ordaz industrial region. Venezuela's National Railway Economic Commission has invited study and recommendations on the proposal from a representative of the Canadian National Railways' planning and development committee. Proponents of the railway see it as a vital carrier of coal for the steel industry at Matanzas, and as an aid in the development of the eastern Venezuela economy.

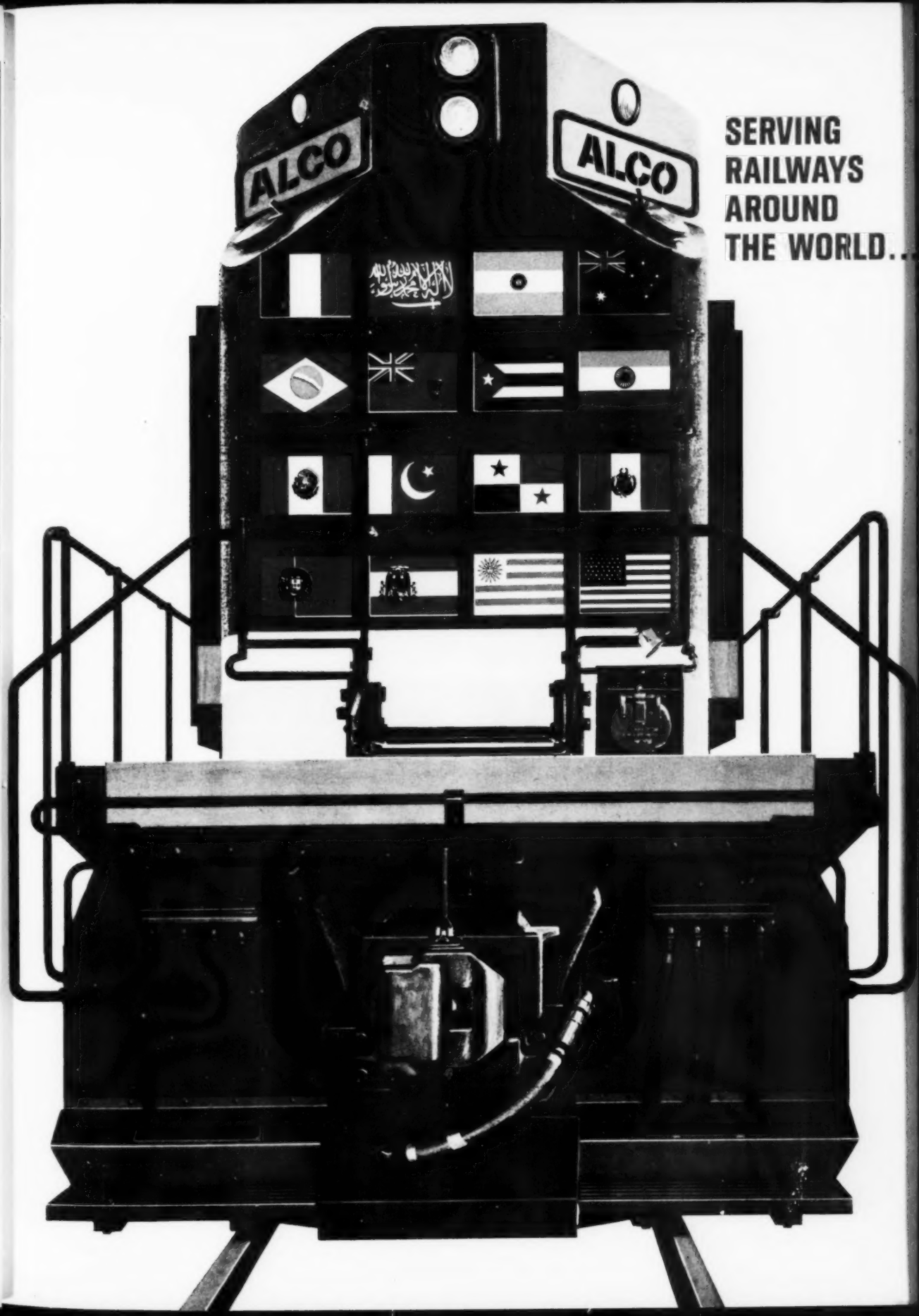
JAPAN: The Japanese National Railways have unveiled plans for a high-speed 30-car electric freight train for use on the Tokaido line, now under construction between Tokyo and Osaka. The train of standard-gauge motorized flat cars, designed for the handling of containers and palletized freight, is to consist of three 10-car units.

USSR: Soviet engineers are reported to be studying the feasibility of building a high-speed (up to 600 km/h) monorail line linking Moscow with the Caucasus. Also under study is an express line linking the Karaganda iron and steel works with Temir-Tau. Any major monorail construction will probably be preceded by the building of shorter lines in the Moscow metropolitan area (e.g., between the southwestern district of the capital and Vnukovo Airport). Preliminary estimates indicate that the cost would be only 1/10th of that of a subway.

AUSTRALIA: The Victorian Railway Commissioners have outlined a ten-year development and rehabilitation program for the Victorian Railways. The program, which is to be submitted to the government for approval on a year-to-year basis, calls for some 200 new diesel locomotives, new coaches and freight cars, new suburban trains, and considerable reconstruction of existing trackage. Self-propelled diesel cars for off-hours service on main lines are also being considered. Total cost of the program is estimated at approximately £100 million (Australian) ($225 million U.S.).

TURKEY: Long-discussed plans to link the Turkish and Iranian railways appear to be moving closer to realization. While the Iranian State Railway (see article, p. 42) is extending its line north of Lake Urmia from Sharef Khaneh, the Ministry of Public Works in Ankara has announced plans to extend the Turkish end of the connection. The ministry will build approximately 102 km of line from Mus to Tatvan, to be turned over to the state railway system for operation. Financing is being arranged for the purchase outside Turkey of track supplies, construction machinery, and other needed materials. For the portion of the line east of Lake Van (the lake will presumably be crossed by train-ferry) detailed engineering studies have been made and land partly acquired for 122 km of railway from the city of Van through Ercek to the border near the Iranian village of Kotur. Mountainous terrain will require 4 tunnels on the Mus-Tatvan line, while the newly-surveyed line east of Van will require 5 km of tunneling, including snow tunnels.

CHINA: An all-woman crew operates a streamlined, double-decker train (the "East-Wind") which recently went into service in the Peking suburban area. The train, which runs twice daily between the capital city and the towns of Ch'ang Hsin Tien and Liu Li Ho, includes a self-propelled diesel unit at each end, and four doubledecker coaches in the middle—each with 104 seats on the top deck, 80 on the lower deck, and space for 14 more passengers in landings near the entrance.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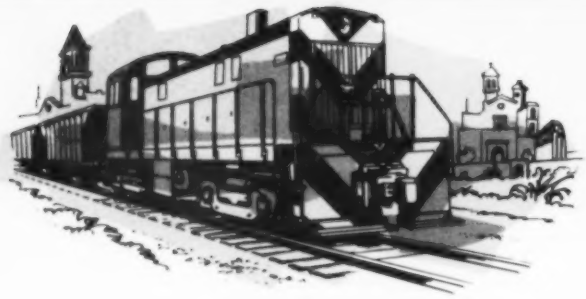
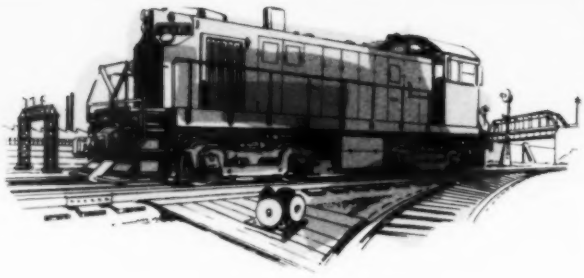
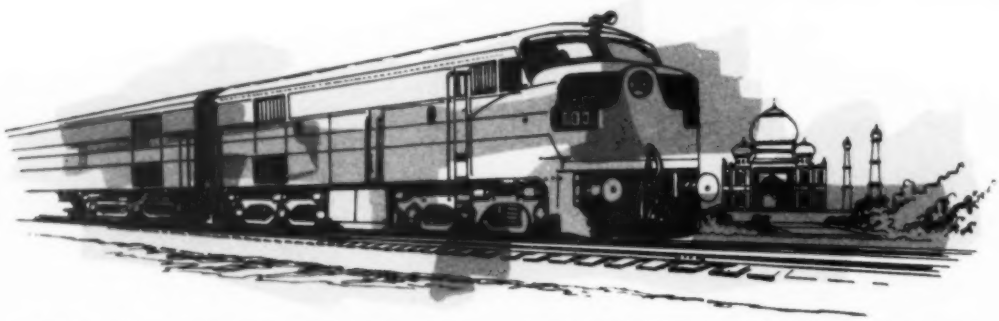


DL-430 FOR SHUNTING, TRANSFER AND BRANCHLINE SERVICE, FROM 22.2 METRIC TONS PER AXLE, GAUGES: 4'8½" AND OVER. **975/900 HP**



DL-440 FOR SHUNTING, TRANSFER AND BRANCHLINE SERVICE, FROM 22.2 METRIC TONS PER AXLE, GAUGES: 4'8½" AND OVER. **1050/950 HP**



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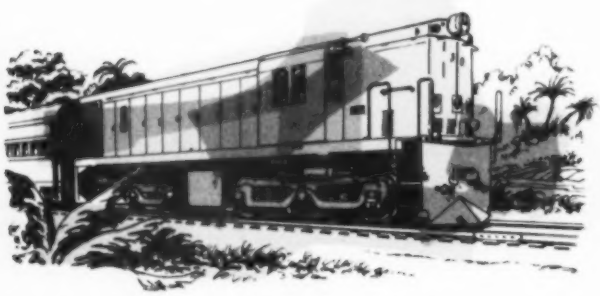

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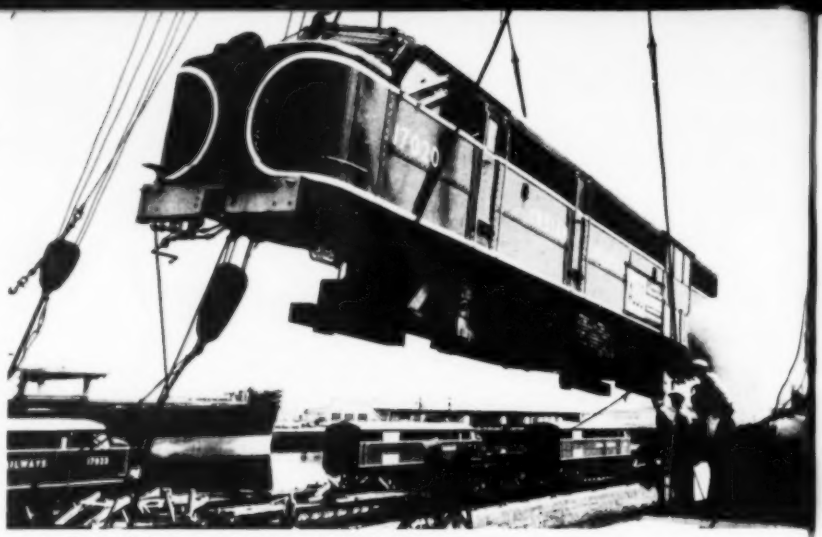

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In Mexico	National Railways of Mexico Ferrocarril Mexicano Altos Hornos de Mexico SA Cia Fundidora de Hierro y Acero de Monterrey F.C. del Sureste F.C. Sonora Baja California F.C. Pacifico F.C. Chihuahua-Pacifico Secretaria de Marina Cia de Cementos de Mixcoac
In Pakistan	North Western Railway
In Panama	Panama Canal Company
In Peru	F.C. Sur (Peruvian Corporation) Southern Peru Copper Corporation
In Portugal	Portuguese State Railways
In Spain	Red Nacional de los Ferrocarriles Españoles
In Uruguay	State Railways Administration

ALCO

ALCO PRODUCTS, INC.

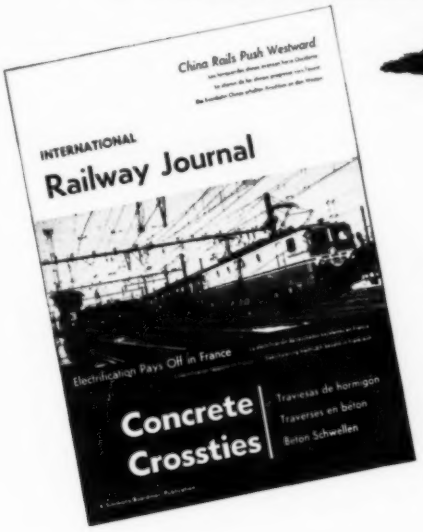
530 Fifth Ave., N.Y. 36, N.Y., U.S.A.

Cable Address: Locomotive, N.Y.

FOREIGN ASSOCIATES AND LICENSEES: Alco Products Export Co., Inc., 8 Grafton St., London; Montreal Locomotive Works, Ltd., Box 1000, Place d'Armes, Montreal; Associated Electrical Industries, Trafford Park, Manchester, England; A. E. Goodwin, Ltd., 315 Parramatta Rd., Auburn, N.S.W., Australia; Textile Machinery Corp., Ltd., 8 India Exchange Pl., Calcutta; Cia Euskalduna, Castellana 1, Madrid. Agents throughout the world.

PRINTED IN U.S.A.

New International Selling Opportunity for Railway Suppliers



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Now, in International Railway Journal, your advertising message can reach the growing *world-wide* market for railway products economically and efficiently . . . in *one* magazine. Through these pages, you are *guaranteed* a global audience of 10,000 decision-making railroad executives, covering virtually every railroad in more than 50 nations.

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Advertising in International Railway Journal can increase prestige and sales in foreign countries where you already have distribution. Simultaneously, you can open up distribution in the foreign markets where you have no distribution. Or, if you plan a future export program, you will familiarize potential buyers with your company and its services.

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Sell in the magazine that sells 'round the world every 30 days. Make space reservations now for the January 1961, issue (closing Dec. 1).

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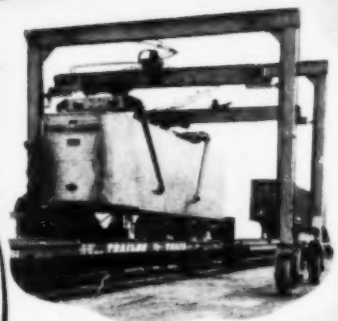
SALES OFFICES: LONDON S.W. 1, ENGLAND, 67/68 Jermyn St., St. James's, Telephone: TRAfalgar 6318 • TOKYO, JAPAN, Shadan Hojin, 14, 2-Chome Marunouchi, International Media Representatives, Ltd. • NEW YORK 7, N. Y., 30 Church Street, Telephone: WOrth 4-3060 • CLEVELAND 15, OHIO, 1501 Euclid Ave., Telephone: MAin 1-4455 • CHICAGO 3, ILL., 79 West Monroe Street, Telephone: RAndolph 6-0794 • PITTSBURGH 19, PA., Suite 203, Carlton House, Telephone: GRant 1-8186 • ATLANTA 9, GA., 22 Eighth Street, N.E., Telephone: TRinity 2-6720 • DALLAS 19, TEXAS, 3915 Lemmon Ave., Telephone: LAkeside 1-2322 • LOS ANGELES 17, CALIF., 1151 W. 6th Street, Telephone: HUntley 2-4000 • SAN FRANCISCO 11, CALIF., 916 Kearny Street, Telephone: GArfield 1-7004 • PORTLAND 5, ORE., Terminal Sales Bldg., Telephone: CApitol 7-4993

Travelift

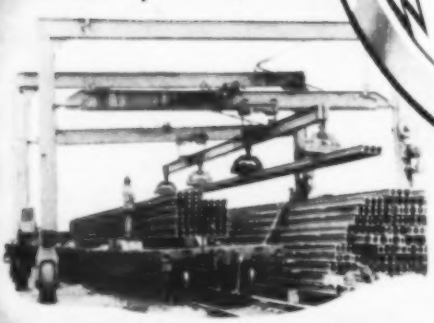
VERTICAL LIFT CARRIER

'ROUND THE COMPASS

Travelift lays railroad rails in Northern Quebec, Canada for Mannix Co., Ltd. on Quebec Cartier's 193 miles of new railway.



Travelift loads eighteen piggy back trailers an hour at the Pennsylvania railroad yards at South Kearney, New Jersey.



Travelift loads a car of "welded rail" in thirty five minutes at National Cylinder Gas' Chemetron Division in Pueblo, Colorado.

Travelift handles freight containers rapidly for Seatrain Lines at their port at Belle Strasse, New Orleans, Louisiana.

From Hawaii to Iran and Labrador to Venezuela . . . all over America, too. Travelift's versatile lifting is solving many complex handling problems. Particular models launch, haul out, load and unload boats for storage, repair, rail or truck haul . . . handles finished steel and concrete products.

ONE MAN CAN OPERATE

Steering, lifting and propulsion of the ***Self-Propelled*** Travelift are by hydraulics. Turning radius of the Travelift Carrier is short and maneuverability excellent.

Capacities to 100,000 lbs. or custom built to your needs.

Write for information

TRAVELIFT & ENGINEERING, INC.
Dept. IRJ, Sturgeon Bay, Wis.
Please send information on the Self-propelled Travelift.

Name _____

Address _____

City _____ Zone _____ State _____

(Advertisement)

RESUME

De Hawaï en Iran, du Labrador au Venezuela et dans toute l'Amérique, l'ingénieux système de levage de Travelift résoud plusieurs problèmes de manutention. Il y a des modèles spéciaux qui lancent, halent, chargent et déchargent des bateaux pour l'entreposage, les réparations et le transport ou qui manipulent des produits d'acier et de bêton.

UN HOMME SUFFIT POUR LA MANOEUVRE!

Les commandes de direction, de levage et de propulsion du Travelift Automatique sont hydrauliques. Court rayon giratoire, excellente maniabilité.
Capacités jusqu'à 100.000 livres ou selon vos besoins.

RESUMEE

Von Hawaii bis Iran, von Labrador bis Venezuela und in ganz Amerika löst das vielseitige Travelift Hebesystem manche Güterbehandlungsprobleme. Spezialmodelle treideln, laden und entladen Boote zum Lagern, Ausbessern und Abtransportieren, oder behandeln Stahl-und Betonprodukte.

KANN VON EINEM MANN BEDIENT WERDEN!

Die Steuerung, Hebung und der Antrieb des selbstantreibenden Travelift sind hydraulisch. Kurzer Drehradius, sehr leicht zu manövrieren!
Hebefähigkeiten bis zu 100.000 Pfund oder nach Bedarf.

RESUMEN

Lo Mismo en Hawaii que en Irán... ya sea en el Labrador o en Venezuela... y, por supuesto, en todos los Estados Unidos, los equipos de accareo Travelift representan la solución ideal para numerosos problemas difíciles de manipulación de materiales. Los distintos modelos cargan, descargan, izan o bajan los cajones de carga cuando se desee almacenarlos, repararlos o despacharlos por ferrocarril o por camión. También se usan para la manipulación de artículos de acero o de hormigón.

BASTA UN SOLO OPERARIO

Los sistemas de dirección, izaje y propulsión del automotor Travelift son hidráulicos. El Travelift Carrier tiene un radio de giro corto y una maniobrabilidad excelente.
Capacidades hasta para 100,000 libras o hechos a la medida para el cliente.

TRAVELIFT & ENGINEERING INC.

World Market

▶ *Argentine State Railways.*—Will award contracts for the supply of 3,000 railroad cars "of different types and gauges"; 300 railway passenger cars; 100 diesel-electric or diesel-hydraulic locomotives, with spare parts; 192 diesel-electric or diesel-mechanical cranes, of 5-10 and 15 metric ton capacity; 10 wrecking trains; 67,600 springs of several types for railway cars; 12,600 axle boxes and 600 bogie superior centers with bolts and keys for railway cars and wagons. Bids were requested in September. Earlier agreement was reached for the purchase of 150 electric coaches from a Japanese syndicate composed of Tokyo Shibaura Electric, Kawasaki Rolling Stock, Kinki Rolling Stock, and a foreign trading firm, Marubeni-Iida.

▶ *Ceylon State Railways.*—Ordered five additional diesel railcars from the Nürnberg Works of Maschinenfabrik Augsburg-Nürnberg for suburban service in Colombo. This follows an earlier order for 25 of the M-A-N cars, which are now in service.

▶ *Chile.*—Construction of an iron ore railroad is contemplated by the Compania de Acero del Pacifico, S.A., (CAP), which has received a $15.6 million credit from the Export-Import Bank of Washington for development of iron ore deposits in the Chilean Province of Atacama.

▶ *Colombian National Railways.*—Will acquire 16 diesel locomotives, 285 freight cars, replacement parts for passenger cars, and shop equipment with the proceeds from a dollar loan approved by the International Bank for Reconstruction and Development (World Bank) on September 13. The $5,400,000 loan will provide for part of the extensive construction and rehabilitation program submitted by Minister of Public Works Barco last May. The equipment is to be used on the Atlantic Railway of the national system, now under construction and expected to be in full operation early next year.

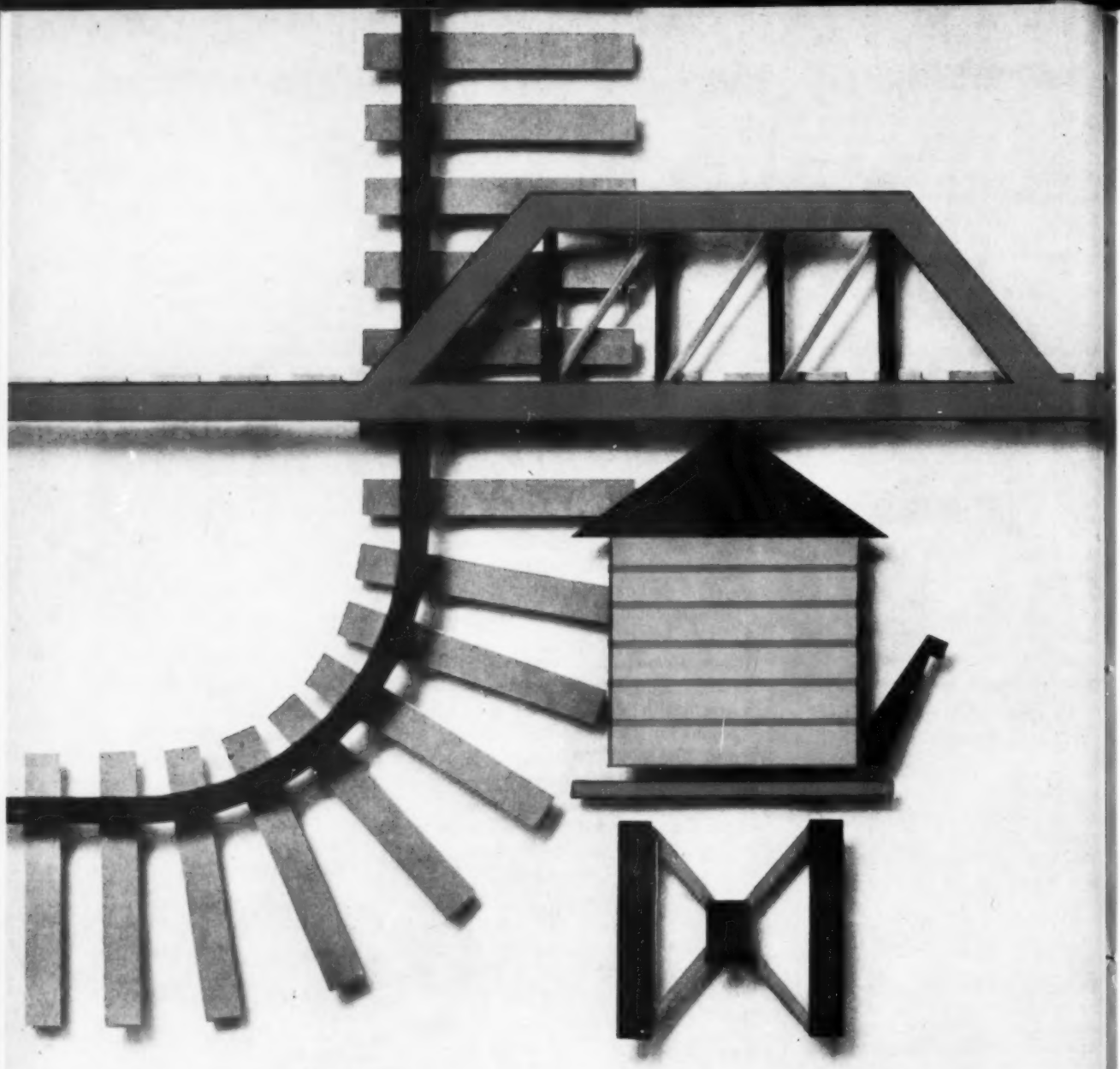
▶ *Coras Iompair Eireann (Irish Transport Company).*—Will accept delivery, beginning in December, of 15 950-h.p., GL-8 diesels ordered from General Motors Overseas at a cost of approximately £714,286 ($2,000,000 U.S.). Of C.I.E.'s existing fleet of 139 diesel locomotives, 26 were built in Ireland with imported components, 109 were imported from England and four from Germany.

▶ *East African Railways and Harbours.*—The Transport Advisory Council and its Railway and Harbour Committees have recommended that a Loan Bill for £5.5 million ($15.4 million U.S.) be presented to the Central Legislative Assembly. The bill would provide £2,200,000 for the Mnyusi-Ruvu rail link in Tanganyika; £550,000 for a rail extension in Uganda from Soroti to Lira; and £1,000,000 for new diesel locomotives and rolling stock. Other projects recommended by the council: relaying of 88.8 km of the Dar es Salaam-Mkata section of the Central Line in Tanganyika with new 30-kg rail, at a cost of £678,000; purchase of 146 tank wagon units at a cost of £308,000.

▶ *German Federal Railways.*—Awarded contracts valued at DM 390 million ($94 million U.S.) for 342 electric locomotives. Deliveries will begin in mid-1961 and are to be completed by 1964. The locomotives are to built by Krauss-Maffei, Henschel, and Krupp, and the power units by Siemens, A.E.G., and Brown Boveri.

(Continued on page 55)

LIBRARY



NOW...PROTECT EQUIPMENT THE LOW-COST CALTEX WAY

Long-Term Protection Against Rust. Caltex Rustproof Compound is an unusually rugged petroleum-based substance that provides as much as ten years' protection for such structures as bridges, turntables, water tanks and ice plants. This compound not only protects against rust but can be applied to existing rust to halt further corrosion. Unaffected by brine drip, sewage or diesel exhaust, Caltex low-cost Rustproof Compound dries to a self-sealing, weather-proof film that won't harden or crack even under heavy vibration. Available in five grades—light grades for fast spraying; heavier grades for brush or hot dip application that provides longest protection.

Longer Life for Wooden Bridges. Caltex Liquid Bridge Cement is a rugged substance that greatly increases the life expectancy of ties, stringers and decking. Actual use-records reveal that a single application will last more than eight years, at a nominal cost per tie. Caltex Liquid Bridge Cement waterproofs completely, preventing the cracking and splitting that leads to costly frost damage. This low-cost coating can be applied with mops or brushes or cut back for quick and easy spraying. For complete information, write or telephone your nearest Caltex office.

CALTEX

RAILROAD LUBRICANTS

WORLD POLL

Plans for 1961 capital spending programmes are being progressed on railways in all countries. Still subject, in most cases, to final approval, the accompanying tables are an indication of what railways are planning for the next 12 to 18 months in new and improved facilities and rolling stock.

A travers le monde entier, les chemins de fer établissent actuellement leur programme d'inventissements pour 1961. Bien que la plupart des tableaux ci-joints ne soient pas encore approuvés, ils donnent, cependant, une indication du montant envisagé pour la modernisation des installations et du matériel, au cours des 12 à 18 prochains mois.

Die Eisenbahnen aller Länder sind dabei, ihre Wirtschaftspläne für das Jahr 1961 aufzustellen. Sie bedürfen in den meisten Fällen noch der endgültigen Genehmigung. Aus den beiliegenden Tabellen ist zu ersehen, was die Eisenbahnen in den nächsten 12 bis 18 Monaten hinsichtlich neuer und verbesserter Anlagen und Fahrzeuge planen.

En los ferrocarriles del mundo entero se están formulando los planes para las inversiones capitales durante 1961. Aunque pendientes todavía de la aprobación final, los datos contenidos en estas tablas dan una indicación de lo que planean las empresas ferroviarias para mejorar sus instalaciones y material rodante durante el siguiente año o año y medio.

●

NEW ZEALAND GOVERNMENT RAILWAYS

Total: £ 7,159,000*

Locomotives	£ 209,000
Passenger cars	£ 105,000
Freight cars	£ 2,291,000
Total rolling stock	£ 2,605,000
Ferries	£ 500,000
Major track improvements	£ 550,000
Signalling	£ 130,250
Communications	£ 107,479
Yards and terminals	£ 1,084,300
Shops and repair facilities	£ 639,843
Highway, services, real estate, bridges etc.	£ 1,248,000
Unlisted expenses	£ 294,128
Total other expenditures	£ 4,554,000

* £ 100 = $ 280 U.S.
Figures are for current fiscal year (ends March 31, 1961).

SOCIETE NATIONALE DES CHEMINS DE FER LUXEMBOURGEOIS

Total: 173.1 million francs*

Locomotives	31.5 mil. francs
Passenger cars	3.6 mil. francs
Freight cars	26.3 mil. francs
Total rolling stock	61.4 mil. francs
Major track improvements	44.0 mil. francs
Signalling and communications	17.7 mil. francs
Yards and terminals	10.6 mil. francs
Shops and repair facilities	5.7 mil. francs
Electrification, cartage, crossings etc.	33.7 mil. francs
Total other expenditures	111.7 mil. francs

* 100 Lux. francs = $ 2.00 U.S.

STATE RAILWAY OF THAILAND

Total: 163,993,000 Bahts*

Freight cars	29,635,000 Bahts
Total rolling stock	29,635,000 Bahts
New line construction	51,250,000 Bahts
Major track improvements	2,822,000 Bahts
Signalling	4,509,000 Bahts
Communications	1,707,000 Bahts
Yards and terminals	22,000,000 Bahts
Shops and repair facilities	6,365,000 Bahts
Bridges and buildings	36,168,000 Bahts
Training centre	4,037,000 Bahts
Miscellaneous	5,500,000 Bahts
Total other expenditures	134,358,000 Bahts

* 100 Bahts = $ 4.87 U.S.

SUDAN RAILWAYS

Total: £S 10,130,000*

Locomotives	£S 2,300,000
Passenger cars	£S 800,000
Freight cars	£S 1,100,000
Total rolling stock	£S 4,200,000
New line construction	£S 1,500,000
Major track improvements	£S 700,000
Signalling	£S 100,000
Yards and terminals	£S 700,000
Shops and repair facilities	£S 250,000
Other improvements	£S 2,680,000
Total other expenditures	£S 5,930,000

* £S 100 = $ 286.10 U.S.

(Continued on page 58)

"Long-range planning for advertising?"

"Certainly," says William E. Hill, managing partner of the New York management consulting firm, William E. Hill & Company, and he explains in this message why planning a company's future must include marketing along with products and processes.

"Half the research and development ever done in this country has been since 1955. This rapid acceleration in technology is having a tremendous impact on the conduct of specific marketing functions such as product planning and advertising. Many companies are rightfully concerned about the increasing emphasis on product and process innovation, the threats of product obsolescence, and the requirements of complex market development. And still a greater research effort is forecast for the 1960's, with R&D expenditures projected to reach an estimated level of $25 to $30 billion by 1970, compared with a present rate of $12 billion.

"The capacity of your company to prosper during the next ten years of undoubtedly swift change—to realize the period's profit opportunities—may well depend on your creative marketing and technology. A 5 to 10-year long-range program, that anticipates product and market opportunities and threats before they develop, can provide the advance and imaginative plans and action for competitive leadership in domestic and foreign markets.

"Such planning is providing valuable and confident insight into the future requirements of advertising and its companion marketing functions. When projected in relation to a company's growth program, many a current advertising program and budget is inadequate for the next 5 to 10 years. By this planning process you can optimize advertising's future role in marketing—and establish the major contribution that sound advertising can play in capitalizing on the new markets, new technologies and new management practices of the 1960's."

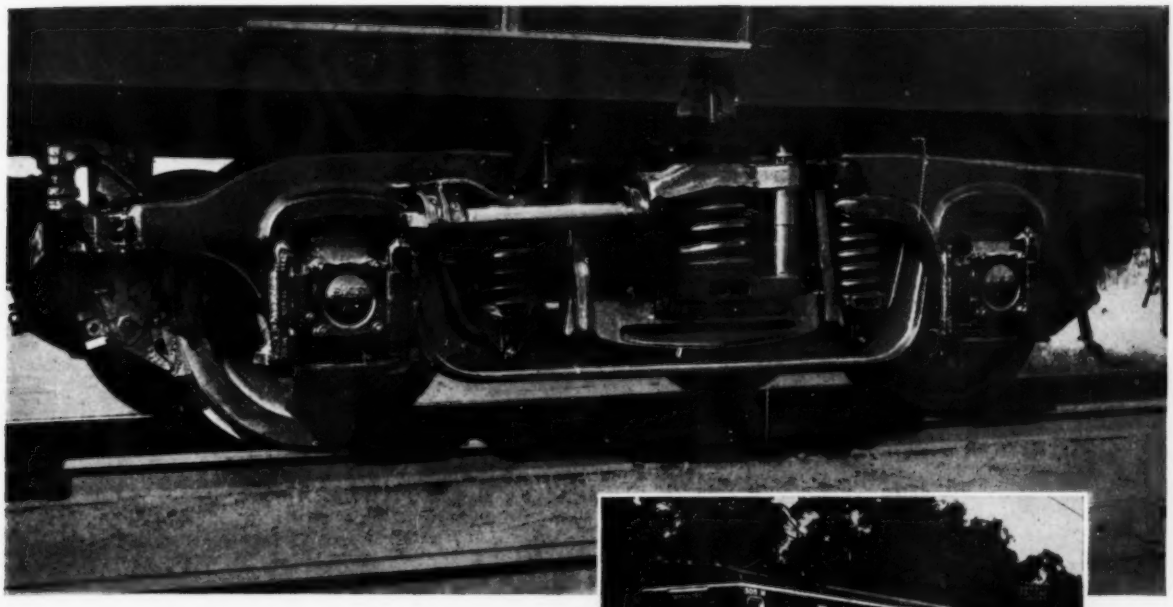
AIA

ASSOCIATION OF INDUSTRIAL ADVERTISERS

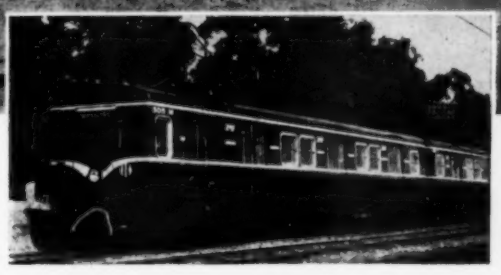
271 madison avenue • new york 16, n. y. • telephone murray hill 5-8921

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PHOENIX, PITTSBURGH, PORTLAND, ROCHESTER, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., TULSA, YOUNGSTOWN.

...where railway progress is cast in steel



Local Transit or Inter-City



COMMONWEALTH-DESIGNED BOGIES TO FIT YOUR PURPOSE

For more than 50 years, General Steel Castings has designed, furnished and service-tested Commonwealth motor bogies to meet the special demands of railways and transit systems throughout the world.

All this experience is at your disposal, to develop the particular design which will provide your system with the best in motor bogies. Each design is based on General Steel's superior one-piece cast steel frame and auxiliary components which contribute to better operation, greater passenger comfort and lower operating costs.

For *your* car building or modernization program, specify Commonwealth bogies.

Commonwealth products are furnished completely machined and are designed for all track gauges by

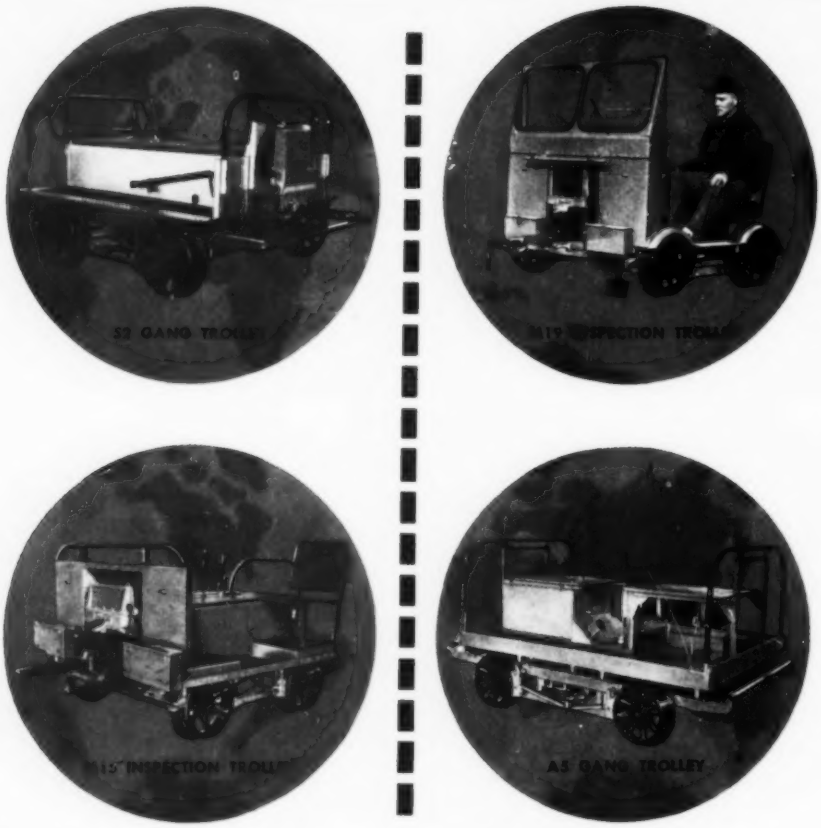
GENERAL STEEL CASTINGS CORPORATION

Granite City, Ill. • Eddystone, Pa. • Avonmore, Pa., U. S. A.

Commonwealth Products are produced under license in Australia, Canada, England and South Africa

COMMONWEALTH SALES CORPORATION

International Representatives: Granite City, Illinois, U. S. A., *Telegraph:* "Comsteelco"



FAIRMONT...

more trolleys—world over—than all other makes combined!

In some parts of the world they're called "trolleys" . . . in others they're known as "motor cars" . . . but world over, these sturdy Fairmont right-of-way workhorses are known for their dependability and economy. Today, of all the trolleys of all kinds now in service, more than 50% are "Fairmont"!

For more than a half century Fairmont has been building quality trolleys and maintenance-of-way equipment for the railroads of the world . . . for all kinds of conditions where the work is hard and the going rough. Fairmont offers the widest line of trolleys, in sizes and models for all your operating needs. Agencies throughout the world can supply the latest in Fairmont equipment.

RESUMEN

más troles en el mundo entero que todas las otras marcas juntas!

En algunas partes los llaman troles...en otras se conocen con el nombre de vagones motores, pero en todo el mundo estos fuertes y resistentes vagones Fairmont son famosos por su economia y eficiencia en los trabajos de vía. Por eso es que, de todos los troles actualmente en servicio, más del 50% son Fairmont!

Desde hace más de medio siglo la Fairmont viene construyendo troles y equipos de calidad para el mantenimiento de vías, ofreciéndolos a los ferrocarriles de todo el globo para cualquier caso en que el trabajo sea duro y las conidiciones dificiles.

La Fairmont pone a su disposición la serie más variada de troles, en el tamaño y modelo que mejor se adapte a sus necesidades. Vea lo último en equipos Fairmont en las agencias de esta firma en el mundo entero.

RÉSUMÉ

A travers le monde, FAIRMONT possède plus de draisines en circulation que tous les autres constructeurs réunis.

Dans les diverses parties du monde, elles portent un nom différent, mais partout, ces vigoureux engins pour la voie, de fabrication FAIRMONT, sont connus pour leur sûreté et leur économie. Actuellement, parmi les draisines en service, plus de 50% portent la marque „FAIRMONT".

Pendant plus d'un demi-siècle, FAIRMONT a construit, pour tous les réseaux du monde, des draisines et du matériel d'entretien des voies de qualité, utlisables quelles que soient les conditions: travail pénible ou roulement difficile.

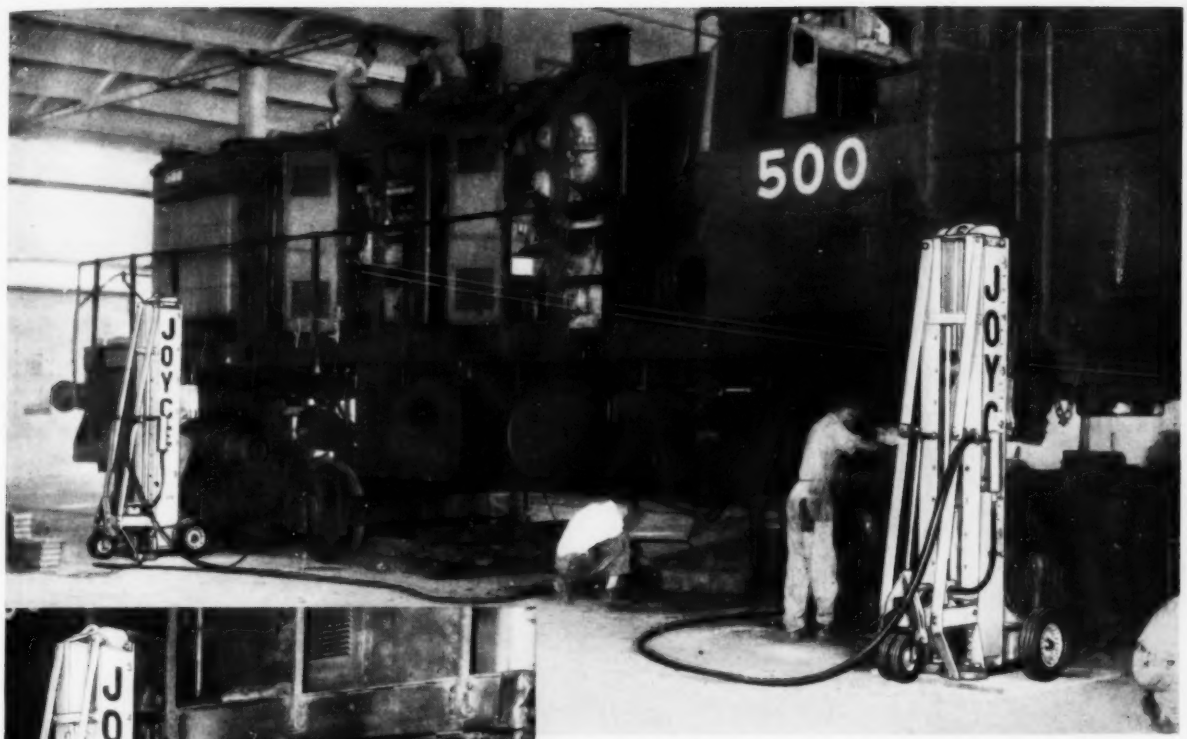
Pour répondre à tous vos besoins d'exploitation, FAIRMONT offre le plus grand choix de draisines, tant en taille qu'en en modèle. Grâce aux nombreuses représentations établies à travers le monde, les plus récents modèles FAIRMONT peuvent vous être livrés.—

AUSZUG

mehr Oberleitungsfahrzeuge — in der ganzen Welt — als alle anderen Marken zusammen! In einigen Teilen der Erde nennt man sie „Strassenbahnwagen"... in anderen „Motorwagen"... doch überall sind diese stabilen Fairmont — Arbeitspferde bekannt für ihre Zuverlässigkeit und Wirtschaftlichkeit. Heute sind mehr als 50 Prozent von allen Oberleitungsfahrzeugen, die in jeder Art in Dienst genommen wurden, „Fairmont"!

Seit mehr als einem halben Jahrhundert baut Fairmont Oberleitungsfahrzeuge von Qualität und Oberbau-Unterhaltungsgeräte für die Eisenbahnen in aller Welt — — — für jede Art von Konditionen, wo die Arbeit hart ist und das Gehen schwer. Fairmont bietet die grösste Auswahl an Oberleitungsfahrzeugen, in Grösse und Modellen nach Ihren vorhandenen Bedürfnissen. Agenturen in der ganzen Welt sind in der Lage, die neueste Fairmont-Ausrüstung zu beschaffen.

FAIRMONT RAILWAY MOTORS, INC. • FAIRMONT, MINNESOTA • U.S.A.



Four synchronized Joyce 35-AHL Jacks lift diesel locomotive free of trucks. Air operation through multiple-valve arrangement assures level rise.

Closer view shows how locomotive body can be lifted entirely off trucks. Four jacks could also be used to lift locomotive, trucks and all, entirely off track.

JOYCE ALUMINUM, AIR-OPERATED SHOP JACKS

speed service on diesel locomotives and all railroad cars

A satisfied customer states:
"... the Joyce Model 35-AHL compressed air jacks each of 35 tons capacity, which we purchased, are fulfilling expectations and are perfectly adapted to the services to which they have been put on this railroad."
Oscar Funes
Ing. Sub-Jefe del Departamento de Locomotoras
ESTRADA DE FERRO ARARAQUARA

Features of joyce 35-AHL jacks:

One-Man Operation... lightweight aluminum alloy construction saves weight. Three wheels equipped with semi-pneumatic tires make trundling and positioning of the jack an easy one-man job.

Air Motor Operated... for safety, convenience and labor savings.

Can be Synchronized... jacks can be used singly... or 2, 3, or 4 jacks can be synchronized through multiple-valve arrangement for positive level lifting.

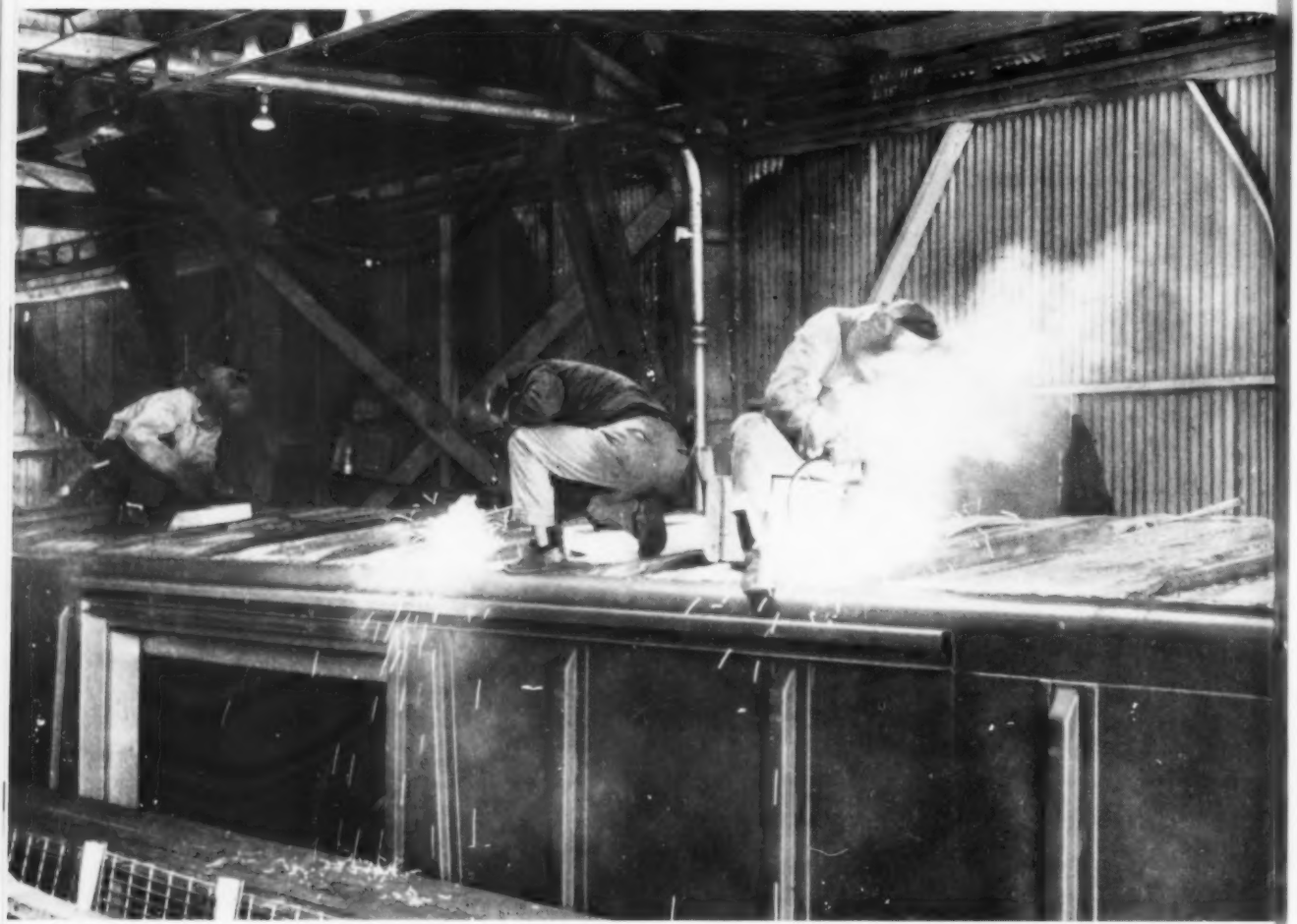
Built-In Safety... jack stops automatically at top and bottom of rise... automatically locks under load in case of air failure. Low center of gravity gives jack excellent stability.

Specifications... 35 tons capacity... 4 ft. $4^1/_2$ inches rise... weight 1620 pounds... operates on 90 PSI pressure.

Write for complete information

THE JOYCE-CRIDLAND COMPANY

Baldwin-Lima Hamilton Corp., Export Department, Philadelphia 42, Pa., U.S.A.



Modern methods are used in the construction of mechanical refrigerator cars. Welded roof prevents air leakage.
Construction de wagons frigorifiques mécaniques selon méthodes modernes; les tois soudés empêchent les fuites d'air.
Mechanischer Kühlwagen mit letzten technischen Neuigkeiten; geschweisstes Dach verhindert Luftverlust.
El techo soldado autógenamente evita las fugas de aire en el nuevo vagón frigorifico.

USA: Mechanical Refrigeration

Railways in the United States are moving swiftly to replace their present fleet of ice-cooled refrigerator cars with new mechanically cooled units.

Ownership of mechanical refrigerator cars has more than quadrupled since 1955—from an estimated 1,200 units then to around 5,200 now.

This trend will probably accelerate in the next decade as railways keep pace with rising consumption of frozen foods, match motor carrier competition and meet expanded shipper demands for cars which provide precise temperature control.

The mechanical refrigerator car is a relative newcomer on rail lines in the United States. While such units have been available for at least 15 years, initial adoption was slowed by economic factors:

● High initial cost was, and to some extent remains, a deterrent. Mechanical refrigerator cars cost from $25,000 to $30,000. A new ice-and-brine car costs about $14,000.

● Availability of a large fleet of ice-cooled cars—an estimated 110,000 units are still in service—caused railways to move cautiously. These units, together with extensive icing facilities, are in good condition. Some shippers, notably in the banana traffic, prefer them. However, studies have been made, and equipment actually developed, looking toward possible conversion of ice-cooled cars into mechanical units.

● A third economic factor which slowed the acquisition of mechanical refrigerator cars until recently was an uncertain traffic outlook. While frozen food consumption increased annually from 1945 onward, it was not until the mid-1950's that this industry could generate tonnages sufficient to warrant investments in the new cars. Meanwhile motor

carriers were busily establishing a beachhead in the handling of frozen food traffic and laying the groundwork for the competitive situation that still exists today.

Despite such factors as these, however, the U.S. railways and their subsidiary car-line companies had acquired a small fleet of mechanical cars by 1955. One large operating company, Fruit Growers Express, actually began studies of such equipment as early as 1948. Other lines, among them Pacific Fruit Express and Santa Fe Railway, also made early acquisitions.

Beginning in the mid-1950's the list of lines owning such units expanded rapidly. Again, there were economic reasons:

● Railway lines, after making successful test shipments, found the new equipment sufficiently versatile to handle not only frozen commodities but a wide range of non-frozen items as well. Today, for example, shippers and buyers of so-called "perishables" (fresh fruit and vegetables) are seeking all the mechanical refrigerator cars they can get. They have learned that the precise temperature control in mechanical units delivers their produce to destination markets in peak condition. The railways, in turn, can provide faster service because of less servicing en route, and are being held liable for fewer damage claims. The success of mechanical units for perishable traffic is illustrated by a report from Fruit Growers Express: That company's 1,271 cars have handled 35 different non-frozen commodities, compared with 42 varieties of frozen food. Nor has fresh fruit and vegetable traffic been the only new application for such wagons. Nylon thread is shipped to commercial looms on giant spools. Normally, the thread must be temperature-conditioned before use. A mechanical refrigerator can provide this pre-conditioning during transit, providing attractive savings in time and extra handlings to railway customers.

● A second factor accelerating the acquisition of mechanical cars in recent years has been the rapid improvement in components—improved temperature controls, better insulation, and diesel power plants with longer life, lower fuel consumption and more compact design. A large number of equipment suppliers have been at work in these areas, and their research is continuing. One measure of their success is reported by Pacific Fruit Express: "Trips per power plant failure increased from 8.96 to 18.5 and (trips) per refrigeration equipment failure rose from 6.82 to 20.0, 1959 over 1956." These PFE figures are significant because this car-line company today operates the

CONTINUED ON PAGE 60

Des Wagons Frigorifiques

Les chemins de fer américains s'efforcent de remplacer de plus en plus vite leur parc de wagons réfrigérants par des wagons frigorifiques, dont le nombre, ayant plus que quadruplé depuis 1955, est passé d'environ 1.200 à environ 5.200.

Cette évolution se poursuit rapidement pour faire face, à la fois à l'accroissement de la consommation de denrées congelées, et à la concurrence routière.

Les dépenses initiales des nouveaux wagons frigorifiques sont considérablement plus élevées que celles des wagons réfrigérants. La différence est, cependant, compensée par la construction de wagons plus grands—15 mètres ou plus, au lieu de 12 mètres—et par l'établissement de tarifs destinés à encourager les chargements plus lourds. Les réseaux espèrent également qu'ils pourront obtenir, avec des négociations, une aide des autorités fiscales leur offrant des possibilités d'amortissements plus intéressantes.

International Railway Journal Octobre 1960 p. 24

Kühlmaschinenwagen

Die Eisenbahnen in den Vereinigten Staaten gehen schnell dazu über, ihren gegenwärtigen Wagenpark von eisbestücken Kühlwagen durch moderne mechanisch betriebene Waggons zu ersetzen.

Der Besitz der mechanisch betriebenen Kühlwagen hat sich seit 1955 mehr als vervierfacht—von einem geschätzten Bestand von 1.200 Wagen damals zu einem gegenwärtigen Bestand von 5.200 Wagen. Diese Bestrebungen werden weiter beschleunigt, um mit dem zunehmenden Verbrauch von Gefriergütern Schritt zu halten und um der wachsenden Konkurrenz des Lastwagens wirksam entgegentreten zu können.

Die Beschaffungskosten für den modernen Kühlwagen sind wesentlich höher als die der eisbestückten Wagen. Diese Mehrkosten werden aber wieder durch den Bau van Wagen mit grösserem Ladegewicht abgefangen—15 Meter und grösser gegenüber 12 Meter vorher—und durch die Einführung besonderer Frachtraten zur Ausnutzung des vollen Laderaums.

International Railway Journal Oktober 1960 S. 24

Vagones Frigoríficos

Con gran diligencia y rapidez, los ferrocarriles de los Estados Unidos están sustituyendo los vagones refrigerados con hielo que tienen actualmente, usando en su lugar unidades con refrigeración mecánica.

A partir de 1955, el número de estos vagones ampezó a aumentar extraordinariamente, al punto en que hoy día las distintas empresas ferroviarias tienen más del cuádruple de unidades; 1,200 en 1955 y alrededor de 5,200 actualmente. El objetivo y razón principal de este cambio acelerado es mantenerse a la par con el consumo cada vezmayor de alimentos congelados, al mismo tiempo que se compite con las companías de transporte por carretera.

Si bien es cierto que el costo inicial de este nuevo tipo de vagones refrigerados es considerablemente mayor que el de las unidades enfriadas con hielo, no debe olvidarse que parte de esa diferencia se compensa con la construcción de vagones de mayor tamano (15 ó más metros, en lugar de los corrientes de 12 metros) y con el establecimiento de tarifas que fomenten el transporte de cargas mayores.

International Railway Journal Octubre 1960 p. 24

Industrial Railways: A Thriving M

Locomotives for shunting service in manufacturing plants, and for road service on private rail lines, comprise a busy market for the world's locomotive builders.

Reports from 12 builders in eight countries show that in the period of July 1, 1959, to July 1, 1960, a total of 282 units were delivered to these industrial customers. Of this number, 256 were diesel-powered, 13 electric, 12 battery and 1 alcohol. Such equipment often requires special engineering to meet unusual conditions. Purchasers of the above units were located in a total of 31 countries of widely different climate and terrain.

In m l-Africa construction crews are pushing a new mining railway into the equatorial jungle. In contrast to what is often the concept of an industrial line, there is nothing small about the new railway; its track, built to a gauge of 1.067 meters (42 inches), will extend northward for 290 km from a junction with the Congo-Ocean line in the Congo Republic. The new line will terminate at M'Binda and will form part of a transportation route that begins near Franceville in the Gabon Republic. Purpose of the new line is to handle shipments of manganese ore from the mines of Compagnie Miniere de l'Ogooue (COMILOG), a French mining concern in Gabon. The ore will travel over a 96-km aerial cableway to M'Binda, and be transferred at that point to COMILOG'S new railway.

The motive power will be far larger and heavier than the usual industrial locomotive. Seven 1,320-hp Co-Co units, supplied by International General Electric and operated in multiples of two and three units, will haul 2,500-ton ore trains over the new line and over part of the Congo-Ocean to storage and loading facilities at Pointe Noire on the Atlantic.

Industrial railways—from light narrow-gauge plantation roads to heavily-built mining railways comparable to standard public main lines—account for a surprising amount of the world's railway mileage. Moreover, such lines provide a steady market for the international railway supply industry.

International Railway Journal, which is beginning a continuing study of the size and characteristics of this market, has asked a group of the world's locomotive builders to list locomotives built for mining, agricultural, lumbering, and other private or quasi-private industrial railways during the period July 1959 to July 1960.

There is, first of all, an extraordinary variety in the kinds of industrial locomotives produced. Many must be tailored to peculiar needs as to terrain, climate and gauge. Track gauge alone covers a wide range—from .457 to 1.676 meters. The range of horsepower is even greater —from tiny 5-hp "dinkies" to standard mainline power of 1800 hp, used in multiples of four for 16,000-ton iron-ore trains.

Even more than the public railways, industrial railways have followed the trend toward dieselization; all but a small percentage of the locomotives reported in International Railway Journal's survey were diesels. One exception deserves mention—a 170-hp alcohol-fueled unit delivered to Taiwan, presumably intended to use by-product alcohol of the industry it serves. Even the underground mine-haulage field, formerly the province of trolley and batterypowered units, has been invaded by the diesel as technical advancement has reduced the hazard from exhaust fumes.

All three types of transmission—mechanical, hydraulic, and electric—appear in the survey results. Mechanical transmission was evident primarily in the very low horsepower range; the hydraulic drive seems most firmly established in the middle range, while electric transmission holds a monopoly over 1,000 hp. There is no hard-and-fast rule, however; diesel-electrics appear in almost all horsepowers, while hydraulic-drive units were delivered with horsepowers as low as 60. As the hydraulic gains increasing acceptance for heavy-duty use on mainline railways, industrial users can be expected to follow suit with orders for diesel-hydraulics of greater power.

A detailed analysis of the survey results finds a total of 256 diesel-powered locomotives; of these, 109 were diesel-electrics, 71 diesel-hydraulics, and 2 diesel-mechanical units. 74 units were diesels

Sentinel 300-hp diesel-hydraulic weighing 48 tons.
Sentinel diesel hydraulique de 300 CV, pesant 48 tonnes.
Die 300 PS dieselhydraulische Lokomotive "Sentinel", 48 t.
La locomotora Diesel hidráulica "Sentinel" de 300 CV, 48 t.

English Electric (Australia) 325-hp diesel-electric.
English Electric (Australie) diesel électrique de 325 CV.
Diesel Lokomotive der English Electric (Austr.) 325 PS.
Locomotora Diesel de la English Electric (Australia) de 325 CV.

ng Market for Locomotive Builders

Locomotives Industrielles

Les locomotives de manoeuvre industrielles et les locomotives de route privées représentent un marché important pour tous les constructeurs de locomotives du monde.

Des rapports publiés par 12 constructeurs, représentant 8 pays, il ressort qu'entre le 1er Juillet 1959 et le 1er Juillet 1960, 282 unités de traction, dont 256 locomotives Diesel, 13 locomotives électriques, 12 locomotives à accumulateurs et 1 locomotive à alcool, ont été livrées à des usines.

International Railway Journal Oct. 1960 p. 26

Werklokomotiven

Der Bedarf an Lokomotiven für den Rangierdienst auf Werkgleisen und den Streckendienst von Privatbahnen bietet den Lokomotivbaufirmen in der Welt gute Absatzmöglichkeiten.

Aus Berichten von 10 Lokomotivbaufirmen aus 8 Ländern geht hervor, daß an diese Industriekunden in der Zeit vom 1 Juli 1959 bis 1 Juli 1960 insgesamt 282 Lokomotiveinheiten geliefert wurden. Davon waren 256 Diesel, 12 Speicher, 13 Ellok und eine Spirituslok.

International Railway Journal Okt. 1960 S. 26

Locomotoras industriales

Mercado excelente de los fabricantes de locomotoras es el de las unidades requeridas para las maniobras en las plantas fabriles y para el servicio en las vías de las empresas ferroviarias particulares.

Según los informes de 12 fabricantes de locomotoras en ocho países distintos, se entregó un total de 282 unidades a estos clientes industriales durante el período de julio 1, 1959 a julio 1, 1960. De este total, 256 eran locomotoras diesel, 13 eléctricas, 12 de acumuladores y 1 de alcohol.

International Railway Journal Oct. 1960 p. 26

with either mechanical or hydraulic transmissions; the manufacturer's reply did not differentiate between the two.

The builders represented in the survey fall generally into two classes: those specializing in industrial locomotives and those whose industrial railway sales are principally to heavy-duty lines where units designed for mainline railway service can be used.

Hunslet and Bagnall in England, Schöma and Gmeinder in Germany are good examples of the first class, while General Motors Diesel and Montreal Locomotive Works in Canada, and English Electric of Australia, fall in the latter group. There is inevitably some overlapping; the industrial locomotive specialists also serve public railways needing low-horsepower switching units and locotractors. There appears, too, to be some tendency to diversify and cover both markets. In the U.S., General Electric, formerly known as a supplier of lower-horsepower units and traction equipment for other manufacturers, moved into the mainline field several years ago with its "Universal" line for export, and only recently announced a 2,500-hp mainline locomotive. General Motors, on the other hand, built its reputation on mainline freight and passenger power, but now offers, through its Canadian subsidiary, two diesel-hydraulic units well suited to industrial

CONTINUED

350-hp diesel hydraulic by Valmet for paper industry.
Diesel hydraulique de 350 CV par Valmet pour papeterie.
Eine 350 PS dieselhydraulische Lokomotive von Valmet.
Locomotora Diesel hidráulica de 350 CV par Valmet.

General Electric 400-hp, 44-ton diesel-electric in Mexico.
Locomotive General Electric de 400 CV pour Mexique.
Eine Lokomotive von General Electric für Mexico.
Una locomotora de la General Electric para el México.

Variety of Industry Needs and Operating Conditions Calls Fo

use. Canadian Locomotive Company, likewise known as a supplier of heavy power, now offers diesel-mechanical, diesel-electric and diesel-hydraulic industrial locomotives built to designs acquired from Davenport and H.K. Porter. Both of the latter were for many years industrial-locomotive builders in the U.S.

Many industrial-locomotive producers —Vulcan and Plymouth in the U.S., Railway Mine and Plantation Co. in England, and Australia's Perry Engineering, for example, have either been relatively inactive or dropped out of the industrial-locomotive market altogether. Other builders are revamping or modernizing their lines with an eye toward increasing their share of the total sales.

While England's W. G. Bagnall Ltd.—long a leader in the industrial-locomotive business—reported no locomotive sales during the 1959-1960 period, the reason given was not a lack of markets. Rather, this firm, following its absorption by a larger company and a complete reorganization, has undertaken a development program for diesel-hydraulics in all gauges ranging from 30 to approximately 750 hp, and mechanical-drive units from 107 to 405 hp.

This idea of new model development has been practiced by other companies, also. Sentinel Ltd., which delivered 28 of its 0-4-0 shunters (200 hp) to British firms in the 1959–60 period, has now announced a diesel-hydraulic locomotive with an output of 300 hp.

Who buys industrial locomotives? The IRJ survey indicates that a market exists wherever there are business enterprises with serious haulage problems. All six continents were represented and 31 different nations in all are represented in the purchase list.

By the same token, there is a locomotive for virtually every requirement, and in many cases the buyer can select a standard model and purchase it almost "off the shelf."

The types of industry for which the 282 units in the IRJ survey were intended were as follows:

Iron and steel	79
Mining	50
Miscellaneous manufacturing	30
Electric power	12
Cement	9
Petroleum and chemical	6
Amusement	5
Agriculture	4
Timber, pulp and paper	4
Unspecified	83

The "amusement" listing is an unusual one; an inquiry to the manufacturer revealed that the five units in question —all standard 5-hp storage battery mining locomotives—were to be used for passenger-hauling trains in a large artificial gold mine to be built at a California amusement park. Even the industrial railway, it seems, has a certain aura of romance about it.

From the sizes and destinations of the "unspecified" group, the locomotives included in it appear to have been intended primarily for construction, plantation and mining service.

Most of the locomotives surveyed were two-axle units—189 in all. Locomotives with two two-axle bogies accounted for 91 units, while the remaining two were three-axle units with side-rod drive.

The distribution of horsepower among the 282 units was uneven. The number of

In 1959-60, 12 Builders Delivered 282 Industrial Locomotives*

Builder	Location	Units Delivered
AEI Traction Division	England	5
Alco Products	U.S.A.	4
Cockerill-Ougree	Belgium	41
English Electric (Aust.)	Australia	9
General Electric	U.S.A.	85
General Motors Diesel Ltd.	Canada	17
Goninan	Australia	3
Montreal Locomotive	Canada	8
Schöttler (SCHÖMA)	Germany	75
Sentinel Ltd (Rolls-Royce)	England	28
Swiss Industrial Company	Switzerland	3
Valmet Oy	Finland	4

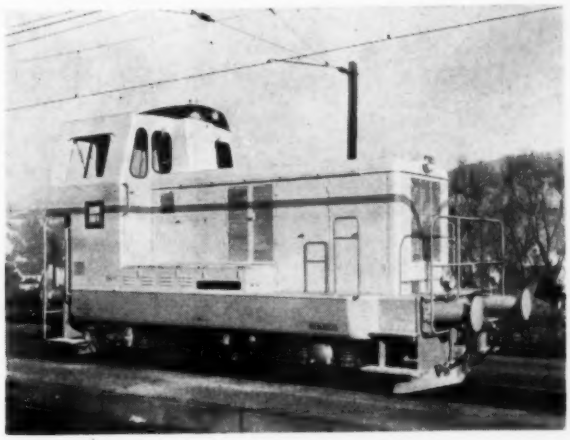
Where deliveries were made

Argentina	7	Jordan	3
Australia	12	Luxembourg	2
Belgium	32	Mexico	7
Borneo	4	Netherlands	7
Canada	28	Peru	5
Congo Republic	2	Philippines	3
Dominican Republic	1	Portugal	1
Ecuador	1	South Africa	1
Finland	4	Spain	9
France	4	Surinam	2
Germany	26	Sweden	3
Great Britain	30	Switzerland	3
India	27	Taiwan	1
Indonesia	2	U.S.A.	45
Iran	2	Venezuela	3
Italy	4	Unknown	2

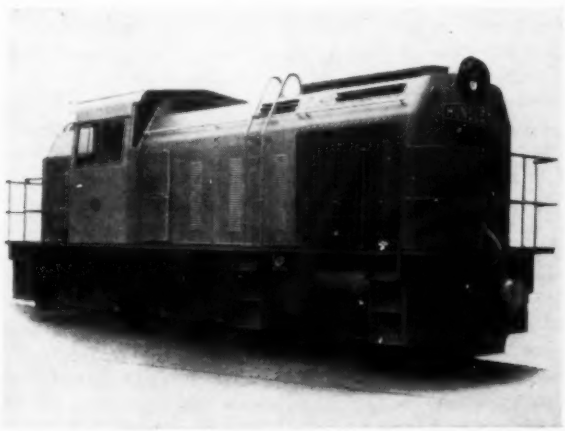
*Based on replies to International Railway Journal's survey.

For Wide Range of Horsepowers, Sizes, Locomotive Designs

1800-hp unit for iron ore trains in Canada, by Montreal.
Unité Montreal de 1800 CV pour trains de minerai.
Eine von Montreal gebaute 1800 PS Einheit für Erzzüge.
Unidad Montreal de 1800 CV para el transporte de minerales.



330 hp diesel electric by Swiss Industrial Co. (SIG).
Diesel électrique de 330 CV par Swiss Industrial Co. (SIG).
Eine 330 PS dieselelektrische Rangierlok der SIG.
Diesel eléctrica de 330 CV de Swiss Industrial Co. (SIG).



Hunslet 637-hp hydraulic for Rhodesian copper mine.
Hunslet hydraulique de 637 CV pour une mine en Rhodésie.
Eine Hunslet 637 PS dieselhydraulische Lokomotive.
Hunslet hidráulica de 637 CV para una mina en Rhodesia.

440 hp diesel hydraulic shunter by Germany's Gmeinder.
Locomotive diesel hydraulique de 440 CV par Gmeinder.
Eine 440 PS dieselhydraulische Rangierlok von Gmeinder.
Locomotora Diesel hidráulica de 440 CV por Gmeinder.

locomotives in various ranges looked like this:

Up to 50 hp	78
51 to 150 hp	14
151 to 200 hp	35
201 to 250 hp	17
251 to 300 hp	48
301 to 400 hp	9
401 to 500 hp	35
501 to 700 hp	13
701 to 1000 hp	13
1001 to 1800 hp	20

The tendency to cluster in the under-50, 200, 300 and 500 horsepower ranges largely follows the use for which the locomotives were intended: very low horsepower units for construction and underground mining use; the 200-hp range for plantations and light shunting; 300 hp for general plant shunting; and larger units for heavy industries such as iron and steel manufacturing. The heaviest group of all included locomotives intended for only one purpose—line haulage of heavy ore trains. Every one of the 20 "over-1000" locomotives was of either 1750 or 1800 hp.

While the market is a specialized one, often with varied and unusual needs, and individual orders seldom call for more than two or three locomotives, it is a healthy market.

Clearly there is a future in the industrial railway market. As the less-developed nations race to develop their natural resources and industrialize, there is every indication that the market will not only continue healthy, but may well expand.

"Students" arrive at Bishop's University, Lennoxville, to begin six weeks of study.
Des étudiants arrivant à l'Université Bishop pour un cours de six semaines.
Die Teilnehmer treffen zu einem sechswöchigen Lehrgang ein.
Los estudiantes llegan a la Universidad Bishop para empezar el curso de seis semanas.

CNR Sends Officers t

Railway organizations can generally be pictured as an equilateral triangle divided into three layers—the bottom layer comprised of the more numerous skilled employees; the center layer consisting of supervisors and so-called middle management; and, at the top, the executives who set policy and direct operations.

Efforts to obtain most efficient use of plant and facilities are today placing new emphasis on the role of the middle group. Effective line supervision is essential if prescribed operating and service goals are to be achieved. Moreover, on most rail systems, this middle group provides a pool of talent from which future executive needs can be met.

Recognition of these principles has led a number of railways in North America to establish special training programs to improve that quality of the mid-management group. The Canadian National Railways have such a program—embracing, among other things, an annual six-weeks' school attended by fifty selected officers from all departments.

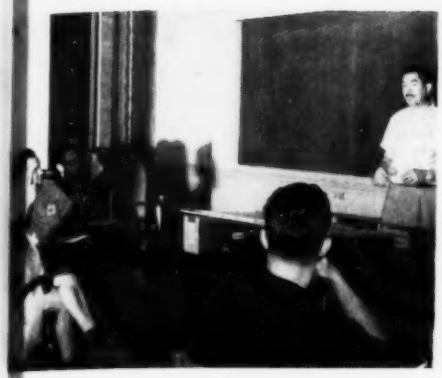
The CNR school seeks to train these men in problem-solving techniques to help them in their positions and in their grasp of management functions. More important, the instruction is designed to help "students" recognize personal strengths and weaknesses and thereby to develop the ability to think clearly and administer wisely.

Fifty Canadian National officers at the end of the third week in July completed the company's six-weeks' staff school program, at Bishop's University, Lennoxville—in the scenic Eastern Townships area of Quebec province, about 100 miles east of Montreal. This is the eighth year of the staff school—the company now has approximately 400 officers (mostly of the middle management category) who have had the benefit of this educational experience.

The school is unusual among railways in North America in that instruction is given not only in management problems common to all business, but also in specific railway problems.

Educational programs of one kind of another, for managers and supervisors, are provided, with greater or less intensity, by most of the larger railways of North America. Some of the instruction is available only to higher management, but as far as numbers of railway officers included goes, emphasis has been directed to middle management. For the higher officers the customary program has been to arrange to have them attend an "advanced management" program—either at one of several large universities or at classes offered by the American Management Association. These "advanced management" courses cover questions common to the management of all businesses, with no particular attention to railroad problems. There are several universities (notably Stanford in California and Northwestern at Evanston, Ill.), where specific education is afforded in annual programs of several weeks' duration.

The main advantage which many attribute to the "advanced management" courses in universities is that they give railroad people intimate acquaintance with managers of other industry. The



Course opens with orientation classes.
Ouverture des cours d'orientation.
Einführungsunterricht beginnt.
Empiezan las clases de orientación.

to School

program of the Canadian National Railways, being restricted to its own people, does not provide this "outside" acquaintance. On the other hand, it does direct the attention of students to specific railroad problems—particularly those of the Canadian National itself.

The Canadian National (owned by the government of Canada, but organized as an independent corporation) is a huge railway system—over 39,000 km of route—extending all the way from Newfoundland in the East to British Columbia on the Pacific—and from Chicago on the South to Hudson's Bay on the North. With a system as far-flung as this, there is naturally a problem of interterritorial and interdepartmental acquaintance; and the staff school helps to solve it. Probably, for middle management on such a railway as CNR, intracompany acquaintance takes precedence in importance over the desirability of "outside" contacts with other industry.

The purpose of the staff school is twofold: (1) by a careful process of screening of potential talent in middle management jobs, the school program gives management desirable information on individuals most likely to profit from this educational opportunity and (2), once these likely candidates are located, the school gives them instruction and impetus for self-improvement. The company's statement of the aims of the school reads in part as follows:

"The Staff Training Course is designed to bring into sharp perspective the human, economic and technological forces involved in management functions; and to

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Le CNR Envoit ses Dirigeants Suivre des Cours

L'organisation d'un chemin de fer peut, en général, être représentée par un triangle equilatéral divisé en trois parties: la base comprenant les agents d'éxécution, de plus en plus spécialisés, la partie intermédiaire formée par les agents des cadres supérieurs, chargés de superviser le travail, et le sommet constitué par les directeurs ayant pour tâche d'établir la politique du réseau et de diriger l'exploitation de l'entreprise.

Afin d'obtenir une utilisation plus rentable des installations, les efforts portent principalement sur le rôle que devra jouer le groupe intermédiaire.

Une supervision efficace est essentielle, si l'on désire atteindre les objectifs que l'on s'est donnés. Ce groupe intermédiaire, qui comprend des agents capables, sera amené à fournir les futurs directeurs.

Ces principes ayant été reconnus, un certain nombre de compagnies de chemins de fer en Amérique du Nord ont établi des programmes spéciaux d'éducation, destinés à améliorer la qualité des cadres supérieurs.

Le Canadian National a un tel programme; celui-ci comprend, entre autre, un cours annuel d'une durée de six semaines, auquel assistent 50 dirigeants.

International Railway Journal Octobre 1960 p. 30

Die Canadian National schickt Beamte zur Schule

Im Zusammenhang mit den Bemühungen um wirksamste Ausnutzung der Anlagen und Einrichtungen, kommt den als Dienststellenleiter tätigen Kräften der mittleren Laufbahn besondere Bedeutung zu. Beste Überwachung auf der ganzen Linie ist wichtig, wenn die, hinsichtlich Betriebsleistungen und Verkehrsbedienung, gesetzten Ziele erreicht werden sollen. Außerdem gibt es bei den meisten Eisenbahnverwaltungen unter den Bediensteten der mittleren Laufbahn Talente, auf die künftig bei der Besetzung leitender Posten zurückgegriffen werden kann. In Anerkennung dieser Grundgedanken haben eine Reihe von Eisenbahngesellschaften in Nordamerika Sonderlehrgänge für diese Gruppe von Bediensteten eingerichtet, um deren Ausbildungsstand zu verbessern. Die Canadian National Eisenbahngesellschaft hat ebenfalls ein solches Schulungsprogramm eingeführt, das unter anderem eineneinmal im Jahr abzuhaltenen sechswöchentlichen Lehrgang vorsieht, an welchem 50 Beamte dieser Eisenbahngesellschaft teilnehmen.

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Cursos para los Empleados del CNR

Hoy en día, debido al interés adicional en el uso eficiente de las instalaciones y del material, se está poniendo un nuevo énfasis en el papel que juega la sección medio de la gestión. Para poder alcanzar los objetivos prescritos en las fases de operación y servicio, es preciso contar con una supervisión efectiva en la línea; más aún, en la mayoría de los sistemas ferroviarios, este grupo medio representa una fuente de talento de la que emergerán los futuros dirigentes de la empresa.

La aceptación de estos principios ha llevado a varios ferrocarriles de la América del Norte a establecer programas especiales de entrenamiento para mejorar la calidad del personal en ese grupo supervisor. Los Ferrocarriles Nacionales del Canadá (CNR) tienen ese tipo de programa, incluyendo entre otras actividades, un curso anual de seis semanas que se da a cincuenta de empleados de la compañía.

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train railway officers in the broad principles and techniques of modern business management and their application to the railway as a whole. Another aim of the Course is to help the student to know himself, his strengths and weaknesses, and to help him to take the proper direction in order to develop the ability to think logically, express himself clearly and administer wisely."

Expert teachers from leading universities conduct courses in standard management subjects at the school. But the selection of the students and the administration of the program is strictly an "inside job" of the CNR management. The activity is directly headed by W. T. Wilson, vice-president, personnel.

Each annual session has a "co-ordinator"—who, in a usual academic set-up, would be called a dean. Since the first session of the staff college, the man chosen as co-ordinator has invariably been one who has gone through the program himself; and the year before he takes over as co-ordinator, he spends a lot of time on the job with his predecessor, "learning the ropes". The co-ordinator for the 1960 session was W. G. Hinkel, an officer of the passenger traffic department.

The "senior committee" in charge of the program is made up of the president (Donald Gordon); the vice-president, personnel (W. T. Wilson); and the vice-president, research and development (Dr. O. M. Solandt).

There is, in addition, a "selection board" which is headed by the co-ordinator of the approaching session, assisted by other company officers. The co-ordinator travels over the system and personally interviews the individuals named as candidates. The names of the candidates are proposed by the vice-presidents and department heads, and interviews are set up at various points on the system—a process requiring from two to three months of the co-ordinator's time. But, by the process, the co-ordinator becomes personally acquainted beforehand with all his students.

To be considered as candidates, the supervisors chosen must (1) belong to the category of middle management, (2) show some supervisory ability by actual experience and (3) preferably, be under age 45. (The actual average age has varied from 37 to 40. The average age of the 1960 class was 38, and the average years of service 15).

Appraisal is systematic and includes ratings on physical qualities, personality, facility of expression, qualities of mind, interest and "general impressions". Ratings are given on work records and "growth potentional." Candidates who do not come up with a certain minimum number of points are usually disqualified. Sometimes those who do qualify cannot be accommodated in the year they qualify (since the school is limited to 50)—in which case they are given preference in selection the following year.

The instruction is divided into four main sections: (1) railway operations; (2) modern principles of business administration; (3) labor relations; (4) written and oral English. There are, also, occasionally lecturers from leading "outside" industries, patrons of the railway's services.

The instruction about the railway is provided, in the main, by some dozen of the company's officers—each of whom presents lectures and answers questions on the work of his department.

The business administration and labor relations instruction is given by several professors from universities, specially recruited for the occasion—experts in administrative practices, controls and financial management and marketing. The lecturer in labor relations brings the students up to date on the labor union movement in North America—especially in industries other than railroading, to enable the students to find instructive similarities between labor trends in other industries and those of the railways.

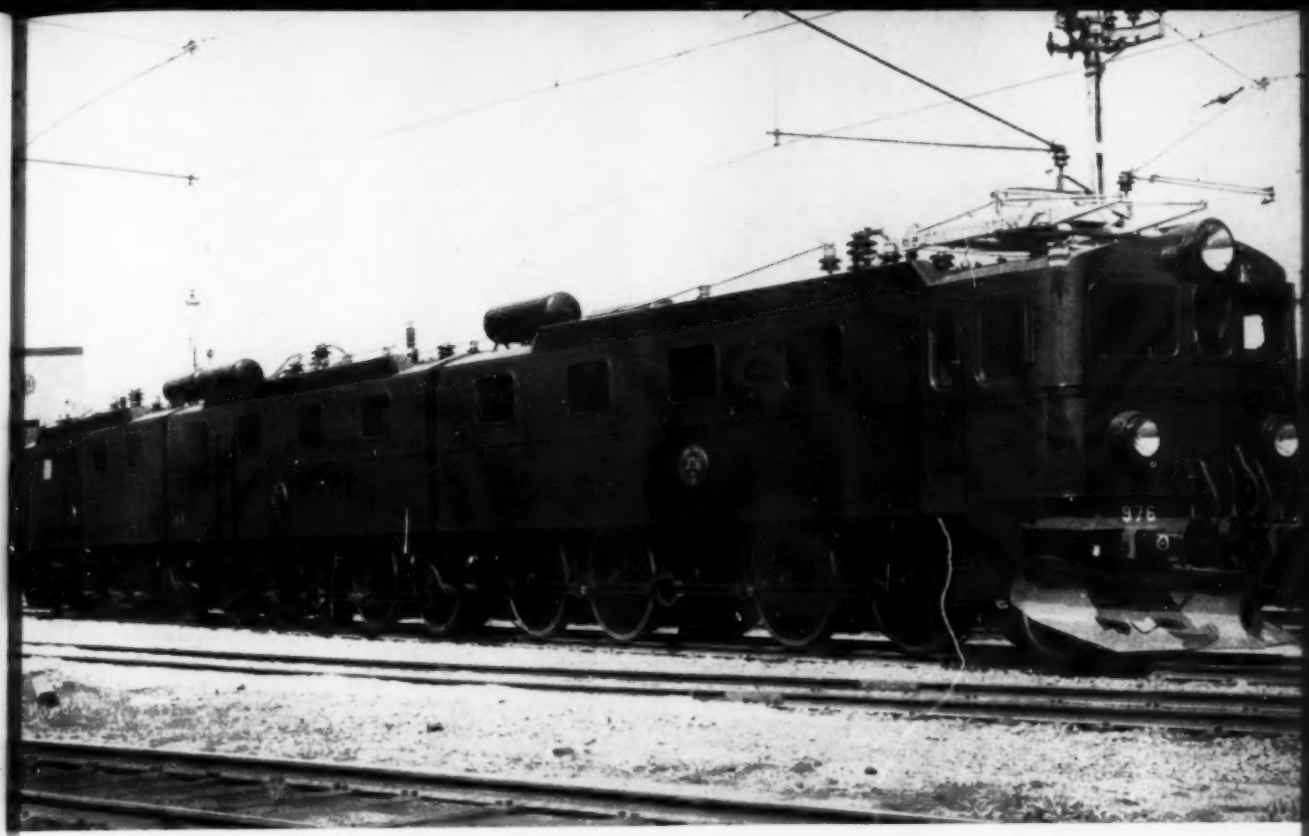
Standard textbooks are used for the management and labor relations courses, where such texts are available, and as much of the instruction as possible is given by the "case method"—the study of actual management problems confronted by specific companies.

A new feature of instruction, introduced at the 1960 session, was that of "business games." In these games, the students are divided into a half-dozen or so teams, which are given typical problems of business policy to decide (quantity of production, price, research expenditures, and so on). The results of each group's decision are worked out on a computer—which determines which decisions yield the most profits.

These games are believed to be particularly effective in conveying to departmental specialists the realization that no department has independent goals—that all departmental activity is relevant only to the degree that it contributes to the primary goal of net earnings.

The future of the railways very largely depends upon the quality of management which the industry can engender. Most large railways in North America are following systematic programs to upgrade the quality of management. The Canadian National's staff school is an outstanding example of endeavor especially suited to a large railway with wide geographical range.

Mobile equipment checks examination papers at end of the course.
Une installation électronique mobile vérifie les épreuves écrites.
Die Prüfungsarbeiten werden mit transportablen Geräten überprüft.
El curso concluido, se revisan los exámenes con el équipo móvil.



The powerful DM-3 locomotive, built by ASEA, hauls iron-ore trains between Kiruna and Narvik.
La locomotive puissante DM-3 construite par ASEA désignée pour trains lourds de minerai de fer.
Die gigantische DM-3 Lok, bei ASEA gebaut, ist für schwere Eisenerzzüge bestimmt.
La locomotora gigantesca DM-3, construida por ASEA, para trenes pesados de minerales.

Sweden Gets Superlocomotives

For hauling iron ore from Kiruna, in Arctic Sweden, to the Norwegian port of Narvik, on the Atlantic ocean, the Swedish State Railways are acquiring three new electric locomotives, 50% more powerful than the largest now in use.

The new engines, designated as DM-3, are being built by ASEA, in Västerås, as main contractor. They each consist of three units permanently coupled together, with a 1-D-D-D-1 wheel arrangement and rod drive. They have a maximum tractive effort of 80 tons, which corresponds to an output of 7,500 hp at 33.5 English miles (54 km) per hour. Their total weight in working order is 260 tons; their over-all length, 35 m; and their maximum speed, 46 English miles (74 km) per hour.

The DM-3 locomotives are intended for pulling a new type of ore car, now under development, which will be larger and have greater carrying capacity than cars now used on the Kiruna-Narvik line. Scheduled loaded weight of these new cars is 75 tons, compared with 54 tons for cars now in use. Thus, a loaded train composed of 65 of the new cars and drawn by the new locomotives will weigh about 4,900 tons compared with 3,200 tons for trains now operated. The heavier trains, however, will be only 13 m longer than present trains.

Basic design of the DM-3 locomotive is similar to that of its predecessor, the DM type, built about five years ago. These weigh 162 tons and are 25 m long. The principal difference between the two engines is that the DM-3 includes a third section, where the DM had only two. This third unit is identical with the other two units, except that it has no cab and no pantagraph.

The Kiruna-Narvik railroad, 100 English miles in length (168 km), handles about 8,000,000 tons of iron ore each year.

Les Superlocomotives

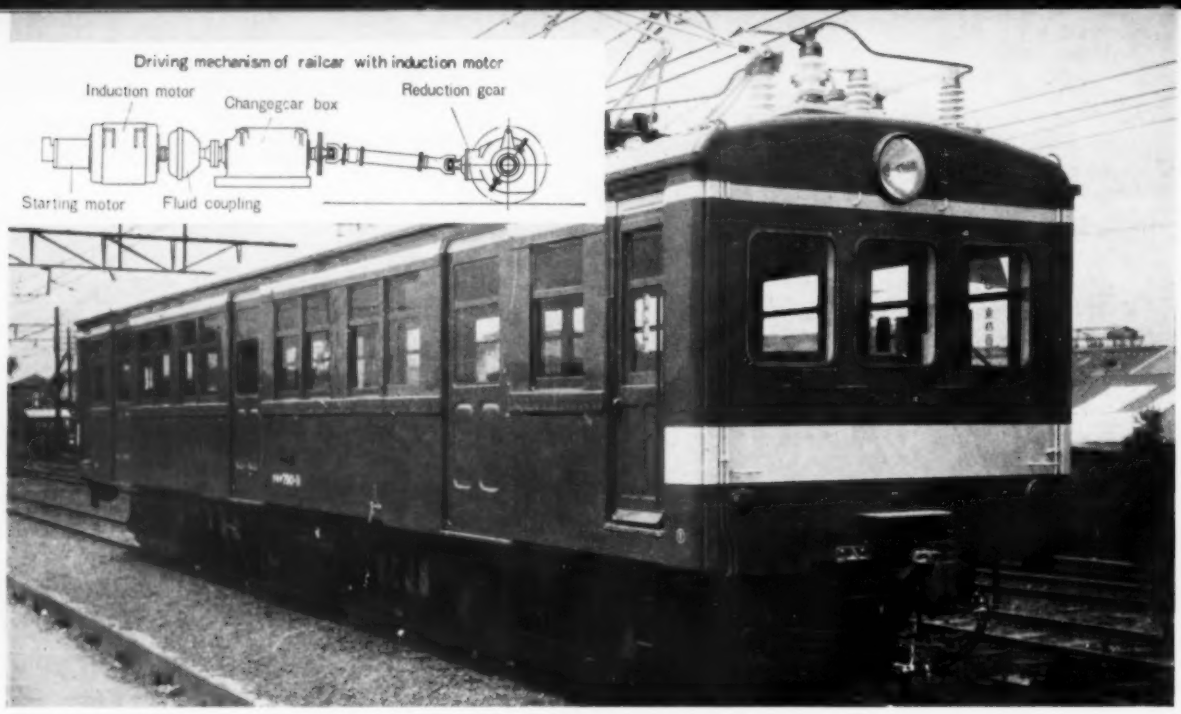
Pour remorquer des trains de minerai lourds, les chemins de fer suédois ont acheté 3 locomotives électriques, d'une puissance de 7.500 C.V. chacune.

Schwedens Superloks

Für die Beförderung schwerer Erzzüge haben die schwedischen Staatsbahnen dreiteilige Ellok mit einer Leistung von je 7,500 PS.

Superlocomotoras en Suecia

Los Ferrocarriles del Estado han adquirido locomotoras eléctricas de tres unidades, de 7,500 HP, para halar los pesados trenes de mineral en Suecia.



Induction-motor railcar for J.N.R. branchlines uses 8-speed gearbox and fluid coupling for speed control.
Automotrice pour J.N.R.; pour voies secondaires boite de vitesse à 8 vitesses et embr. hydr. pour régler la vitesse.
Induktionsmotortriebwagen für J.N.R. Nebengleise braucht 8-Geschw. Getriebekästen zur Geschwindigkeitskontrolle.
Automotor de motor de inducción para vías secundarias de J.N.R.; tiene caja de 8 relaciones para mando de velocidad.

Japan: National Railways Study A

The most economical alternating-current traction equipment to power multiple-unit trains on the Japanese National Railways is now receiving much study. Almost all passenger service on rapidly expanding electrified territories will be with multiple-unit trains. A car driven with commutator motors, another with induction motor and torque converter, and a third with induction motor, fluid coupling and gear train are being compared.

Plans for electrification of the Japanese National Railways call for extensive use of multiple-unit railcar trains, not only for suburban service but for interurban services as well. Locomotive haulage on electrified lines will be restricted almost exclusively to freight trains. Following a recent JNR decision that the major portion of future Japanese electrification will be with 20,000-volt, single-phase, commercial-frequency alternating current, the JNR undertook a program to develop the traction equipment for the multiple-unit cars which will eventually perform practically all passenger services on these a-c routes. Railcar trains offer the following advantages, according to JNR engineers:

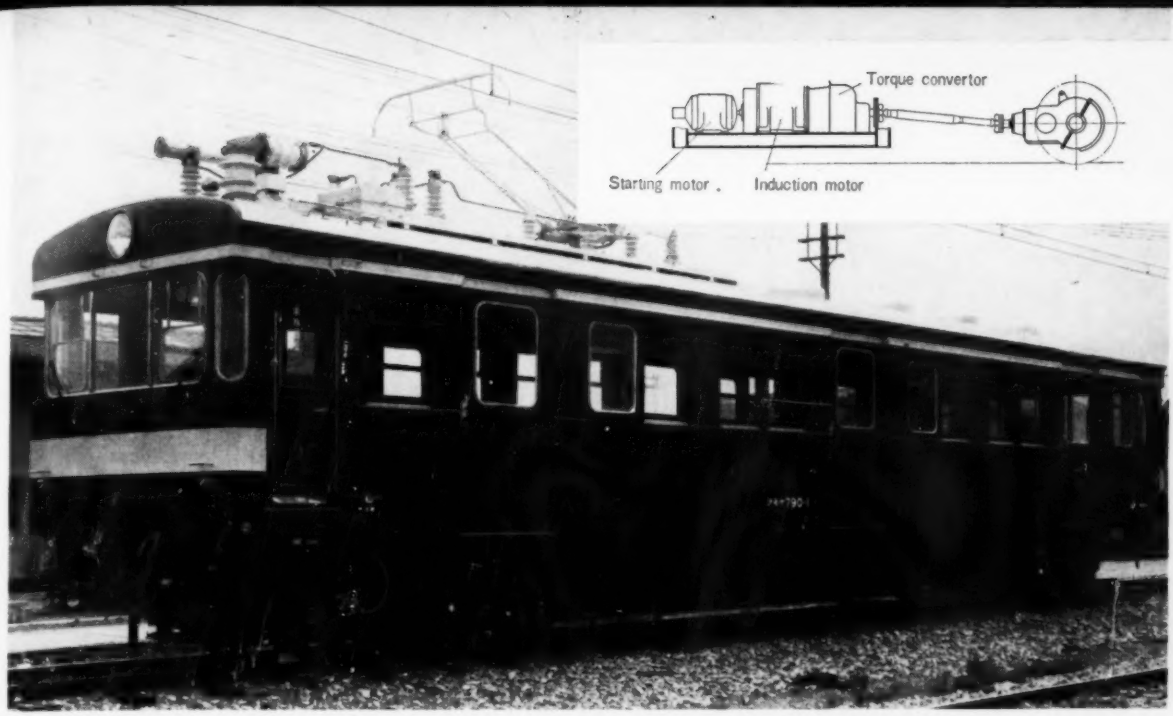
- Train lengths can be varied readily;
- Shuttle services can be operated without complication;
- High acceleration and deceleration can be achieved;
- Passenger comfort of existing locomotive-hauled coaches can be matched;
- Multiple-unit equipment can be mass-produced more cheaply than equivalent complete locomotive-hauled trains.

In 1955 when research on the application of commercial-frequency alternating current was undertaken, the JNR already operated 2,000 km of 1,500-volt direct-current electrification. By 1975 there should be an additional 5,500 km electrified—all this with 20,000-volt, commercial-frequency alternating current. When this is completed, more than one third of all the JNR will be electrified and these routes will handle 75 per cent of all Japanese rail traffic.

At the same time that multiple-unit trains are being acquired for the newly electrified lines, it is planned to replace the locomotive-hauled passenger trains with similar multiple-unit equipment on the present direct-current routes. For suburban services in the Tokyo area, 15-car multiple-unit trains are already being used. The super expresses between Tokyo and Osaka are also multiple-unit sets.

The adoption of alternating current for extensions of present electrified routes introduces the complication of providing equipment which can operate equally well on alternating current and direct current. An added complication is that in different regions of Japan, commercial power is generated at different frequencies—both 50-cycle and 60-cycle-per-second current must be considered.

For operation on the a.c.-d.c. routes, there are two types of cars under consideration. These are the rectifier type and the commutator-motor type. While the commutator-motor application is unsuitable for locomotives because of poor adhesion characteristics, this is not a decisive characteristic for railcar trains. At present, the commutator-motor installation is somewhat lower in initial cost, but the commutator motor itself is more complicated than the d-c motors which are used on the rectifier cars. The real criterion is the cost of maintenance of the commutator motors as compared with the costs of maintaining rectifiers. The



Second branchline design has induction motor, torque convertor; cars are designed to use local alternating current supply.
Type pour voie secondaire. Les voitures sont désignées pour l'utilisation du courant alternatif local.
Zweiter Nebengleistyp hat Induktionsmotor, Drehmomentwandler; Wagen sind für örtlichen Wechselstrom bestimmt.
Otro tipo para vías secundarias, tiene motor de inducción, convertor de par, utiliza corriente alterna de la red local.

A.C. Electric Railcar Designs

JNR engineers expect that developments in silicon rectifiers will bring initial costs of the two types of cars into the same range.

In 1957, the JNR assembled two sets of a.c.-d.c. railcars for tests. Both sets consisted of a motor car and a trailer. Each of the motors was one of the existing d.c. railcars. On the a.c. routes, direct current for the motor car was supplied through mercury rectifiers on the trailer. Two years of testing showed this to be a highly efficient arrangement. In 1959, the mercury rectifiers on one of the trailers

CONTINUED

Automotrices Électriques

Les chemins de fer japonais effectuent actuellement de nombreuses recherches pour déterminer le système de traction à courant alternatif le plus économique devant être adopté pour les rames à unités multiples. Presque tous les services voyageurs seront assurés par des unités multiples dans les régions électrifiées où le trafic se développe rapidement. La comparaison porte sur trois engins, le premier avec moteurs à collecteurs, le deuxième avec moteurs à induction et convertisseurs de couple, le troisième avec moteurs à induction, couplage hydraulique et train d'engrenage.

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Elektrische Triebwagen

Die wirtschaftlichste Wechselstrom-Oberleitungs-Ausrüstung zur Beförderung mehrteiliger Züge auf den Strecken der japanischen Staatsbahnen ist jetzt Gegenstand umfangreicher Studien. Fast der ganze Reisezugverkehr in den sich schnell ausdehnenden elektrifizierten Gebieten wird mit mehrteiligen Triebwagen durchgeführt werden. Triebwagen mit Kommutator-Motoren, solche mit Induktionsmotoren und Drehzahlwechslern, sowie eine dritte Gruppe mit Induktionsmotoren, Flüssigkeitsgetriebe und Zahnradantrieb werden miteinander verglichen.

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Automotores Eléctricos

Objeto de intenso estudio actualmente en los Ferrocarriles Nacionales Japoneses es el equipo de tracción de corriente alterna que resulte más económico para usar con los trenes de unidades múltiples (UM), ya que en los territorios en que se está extendiendo rápidamente el servicio eléctrico casi todos los trenes de pasajeros serán del tipo de unidades múltiples. Por ahora se están comparando un coche impulsado por motores conmutadores, uno con motores de inducción y convertidores de torsión, y un tercero con motores de inducción, acoplamiento hidráulico y tren de engranajes.

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Exterior and interior of commutator-motor car for mainline service; several such designs are being tested.
Extérieur et intérieur de voiture à moteur à collecteur pour voie principale; différents modèles sont à l'essai.
Kommutator-Motorwagen Inneres und Ausseres, für Hauptgleis; verschiedene dieser Typen wurden erprobt.
Exterior e interior del coche de motor con collector para vía principal; con estos tipos se hacen ensayos.

were replaced by silicon rectifiers. Tests of this installation are still under way.

The commutator motor installation is being tested on a three-car set—one motor car and two trailers. Speeds of 110 km/h with 600 kw motor output have been achieved. Motors are 150 kw, eight-pole type which operate at 2,280 rpm. For control, a secondary tap changer on the transformer is used. This car has dynamic braking. All auxiliary motors are single-phase a.c. machines.

One commutator-motor railcar has been built for operation exclusively on a.c. lines. It is the Type KUMOYA 791-1 built by the Kawasaki Rolling Stock Manufacturing Co., and is similar to those used on the Tokaido line.

The JNR had no experience with a.c. commutator motors on the 60-cycle lines, and to test all types of equipment, motors of six different manufacturers were secured for tests. There are two basic types of these: a 150-kw type with forced ventilation, four of which are used to power a set composed of a motor car and two trailers, and a 110-kw self-ventilated type, four of which are used to power a motor car and single trailer. The 110-kw motors were supplied by Tokyo-Shibaura Electric Co. and Hitachi, Ltd. The 150-kw motors came from the Fuji Electric Machine Manufacturing Co. the Mitsubishi Electric Manufacturing Co., the Toyo Electric Manufacturing Co., and Kawasaki Rolling Manufacturing Co. All of them have a series winding, a compensating winding, a commutating winding, and shunt resistance. While the operating speed can be controlled by tap changing on the low side of the main transformer, it can also be controlled with the cam-contactor controller.

The car has dynamic braking.

Its seating capacity is 108 and length over coupler pulling faces is 20,000 mm. Weight is 45.2 tons. Maximum permissable speed is 95 km/h.

In addition to the commutator-type car for the a.c. lines, two cars with induction motors are also under test. This induction motor equipment is being used to study the practicability of electrifying branch lines instead of dieselizing them. Presently, electrification is justified only for heavy traffic lines However, Japanese engineers feel that a simplified railcar could change this.

The KUMOYA 790-1 motor car with a seating capacity of 104 and an overall length of 17,000 mm is designed for operation under 20,000-volt, 50-cycle lines. It is fitted with a constant speed induction motor driving the axles through a torque converter. According to the JNR, construction of this railcar is very simple and cost is low. Because the cage-rotor-type induction motor is very simple and rugged, maintenance costs are low. The torque converter is similar to those used on JNR diesel railcars.

Power from the motor is transmitted through the hydraulic torque converter, propeller shaft with flexible coupling, and the reverse and reduction gears. The motor operates constantly and the car is started and stopped by filling and discharging oil in the hydraulic circuits of the torque converter. The car has dynamic braking with the motor operating as an induction generator on grades. The 130-kw motor is supplied by Hitachi and the single-stage converter and fluid coupling was supplied by Shinko Engineering

A second type of simplified railcar is the KUMOYA 790–11 which has the same physical characteristics as the 790–1 described above. It is fitted with a 134-kw Mitsubishi induction motor which drives through a fluid coupling and an eight-stage gearbox which has electromagnetic clutches. The "cotal" gear unit consits of three planetary gear units connected in series to give the eight different gear ratios. Maximum speed of this car is 100 km/h as compared with the 70 km/h of the 790–1. While the KUMOYA 790–1 was rebuilt by the JNR shops, the 790–11 was rebuilt by Kinki Rolling Stock.

The two induction-motor cars have only a 70 percent efficiency, but the simple motor and controls reduce the initial cost. While tests are being conducted on the 20,000-volt lines, it is intended to use these cars on the light-traffic territories where the local distribution is at 3,000 volts or 6,000 volts.

The three types of equipment—the commutator-motor type, the rectifier type, and the induction-motor type—all have individual advantages. With the commutator-motor cars, regenerative braking is easy. The rectifier type has a promising future because of the expected developments in silicon rectrifiers. The induction-motor type is the most appropriate for the simplified electrification of light-traffic lines. It is the intention of the JNR to take maximum advantage of the individual characteristics of these different equipments as its electrification progresses.

Compare the difference...

G-E universal locomotives are the result of skilled manufacturing and superior product design

❶ **DIESEL ENGINE** of modern 4-stroke turbosupercharged design is built for long life and fuel economy. Exclusive cylinder design provides better cooling, longer engine life, and easier "upper end" maintenance with maximum interchangeability. Articulated connecting rod doubles effective rod bearing area.

❷ **GENERATOR** is mounted directly on the engine. This permits single-bearing construction which eliminates mis-alignment. Flashover tendency is designed out. Simple flexible electric cables are the only transmission connection to the trucks. Ample capacity is available for steep grades, heavy trains and high speeds.

❸ **CONTROLS** are the essence of simplicity. Responsiveness and reliability have been assured by keeping the number of moving parts to a minimum and by using factory-set adjustments.

❹ **HIGH-SPEED TRUCKS** complete with powerful traction motors mounted on each axle have a world-wide reputation for reliability, long life, and high efficiency. Single spur gear of motors drives each axle directly.

MECHANICAL DESIGN is simple, rugged, efficient. Dynamic braking ❺ can be easily added to facilitate train handling, reduce brake shoe wear. A single, direct-driven variable speed fan ❻ gives increased air cooling efficiency. Interchangeability and standardization throughout the universal line reduce parts inventory.

IN ADDITION to these product features, the engineering skill of General Electric is utilized for motive power recommendations based on surveys by experienced technicians; research and development to constantly improve components and concepts, testing complete locomotives on a private multi-gage test track.

Throughout the world General Electric locomotives have established enviable records of performance by producing high gross ton mileages at low cost. To learn how these universal diesel-electric locomotives can benefit your railway, contact your International General Electric representative. 135-E33

Progress Is Our Most Important Product

GENERAL ELECTRIC

LOCOMOTIVE AND CAR EQUIPMENT DEPARTMENT • ERIE, PENNSYLVANIA, U.S.A.
Represented throughout the world by the International General Electric Company
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Western Australian Government Railways handle automobile shipments economically with new low-cost car. Ten units are in service.
Les chemins de fer de l'Australie Occidentale utilisent des vieux chassis de voitures pour transporter les carrosseries d'automobiles.
Für die Beförderung von Autokarrosserien verwenden die westaustralischen Staatsbahnen neue Güterwagen mit Personenwagenfahrgestellen.
Los ferrocarriles de Australia occidental utilizan viejos bastidores de coches para el transporte de carrocerías de automóviles.

Passenger-Car Underframe F

An obsolete passenger-car underframe forms the base of a new automobile-carrying wagon built by the Western Australian Government Railways. Ten units are now in service, and additional units will be built as underframes become available.

WAGR's new "QMB" wagon is designed to facilitate the movement of more than 1,100 automobiles and automobile bodies each month.

The 21.3 m wagon is the longest on the railroad. It can carry 12 automobile bodies loaded in two tiers; or five complete automobiles on the lower tier and six bodies on the upper tier.

Each automobile body is previously mounted on a wooden cradle for quick and easy loading and unloading by crane or forklift.

The top tier of the railroad car is not a fixture, but consists of steel cross beams to which the cradles are clamped, thus eliminating the need for roping. The cross beams, in turn, are screwclamped to the steel uprights. When unloading is begun, the cross beams are unscrewed from the uprights, enabling the forklifts or cranes to lift automobile body, cradle and cross beam in one operation. Then the automobile bodies on the lower tier can be unloaded without obstruction.

The same steel cross beams are used to double-deck automobile bodies in medium-sized open trucks.

Completed automobiles can be loaded by driving them directly onto the wooden decking by means of end ramps. Cranes may be used, if necessary.

The new cars were designed to handle automobile shipments economically and with a minimum of tare haulage. Their efficiency is maintained through the rapid loading and unloading made possible by the special design of the cars.

The prototype unit and the nine similar units that have subsequently been put in service are being used between Kalgoorlie, a transshipping point for interstate traffic, and points near Perth, capital of Western Australia.

Schedules are such that each car completes the 1216-km roundtrip at least six times monthly. Whenever possible, transit is by the "Westfreight" express, a fast overnight freight running at passenger speed between Kalgoorlie and Perth three times a week.

More than 1,100 automobiles and automobile bodies move by rail between factories and distribution points in the eastern states of Australia to agents and assemblers in Western Australia each month.

Dimensions of the prototype car—"QMB" 20,001—are as follows: gauge, 1.067 m; length over buffer beams, 21.3 m; width over body, 2.45 m; width over decking, 2.28 m; height from rail to top of decking, 0.95 m; bogie centers, 16.5 m; tare, 12,450 kg; load, 8,100 kg.

Auto-carrier, which measures 21.3 meters, is longest on WAGR.
D'une longeur de 21.30 m les plus longs wagons de "WAGR".
Mit 21.30 m die längsten Wagen der westaustralischen Staatsbahnen.
Los vagones más largos de los ferrocarriles "WAGR".

Wooden cradles facilitate loading and unloading.
Des sommiers en bois facilitent le déchargement.
Mit Schlitten aus Holz wird das Ausladen erleichert.
Camadas de madera facilitan la descarga.

Forms Base of Auto-Carrier

Un Wagon pour le Transport des Automobiles

Un châssis démodé de voiture constitue l'élément de base d'un nouveau wagon, construit par les Chemins de Fer Gouvernementaux d'Australie Occidentale, pour le transport des automobiles. Dix unités sont actuellement en service et d'autres doivent venir augmenter le parc afin de permettre d'assurer un trafic mensuel s'élevant à plus de 1.100 automobiles et carrosseries d'automobiles entre KALGOORLIE et PERTH (608 kms).

Ce wagon de 21,36 m est le plus long que possède le réseau.

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Ein Westaustralischer Autotransportwagen

Die westaustralischen Staatsbahnen verwenden die Untergestelle von ausgemusterten Personenwagenfahrgestellen für den Bau von Autotransportwagen. Zehn dieser Wagen sind bereits im Betrieb und weitere sollen gebaut werden um die Beförderung von monatlich 1.100 Automobilen und Autokarrosserien zwischen Kalgoorlie und Perth (608 km) besser durchführen zu können. Mit einer Länge von je 21,36 m sind dies die längsten Wagen der westaustralischen Staatsbahnen; sie können 12 Autokarrosserien in zwei Lagen laden.

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Vagón para el transporte de automóviles

La base de un nuevo vagón construído por los Ferrocarriles Occidentales del Gobierno Australiano para el transporte de automóviles consiste en el sub-bastidor ya anticuado de un coche de pasajeros. Ya se tienen diez de estas unidades en servicio, y se construirán otras más para facilitar el transporte de más de 1,100 automóviles y carrocerías al mes entre Kalgoorlie y Perth (608 Km). El vagón, que mide 21.36 metros, es el más largo en el ferrocarril, y puede transportar 12 carrocerías de automóviles en dos camadas.

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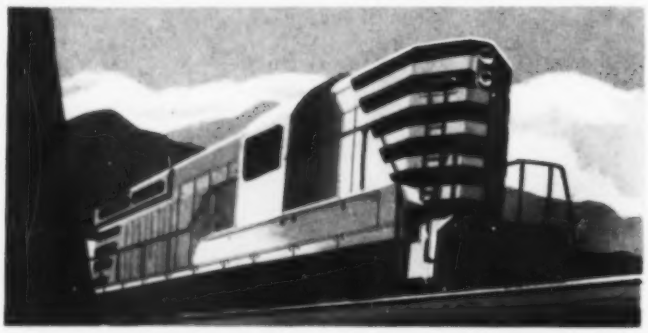
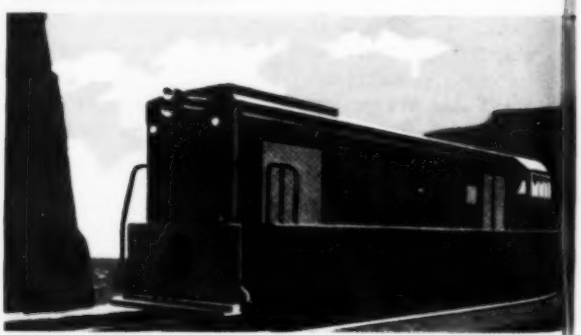
Repeat Orders



from 19 countries

prove the

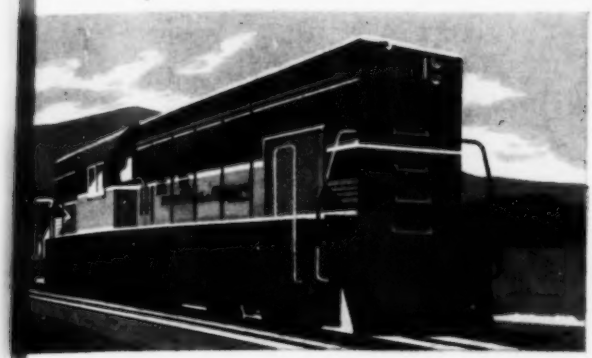


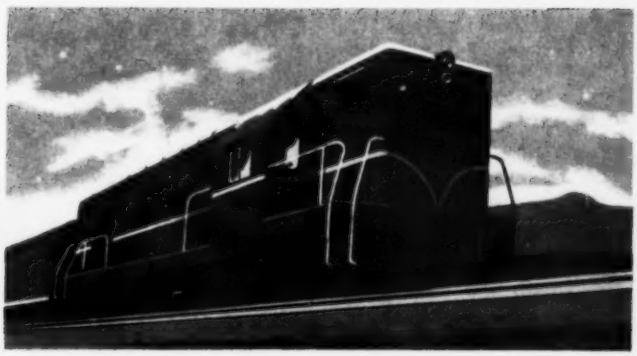
Repeat orders from satisfied customers built our business in the United States where more than two-thirds of the Diesel locomotives in service bear the General Motors name plate.

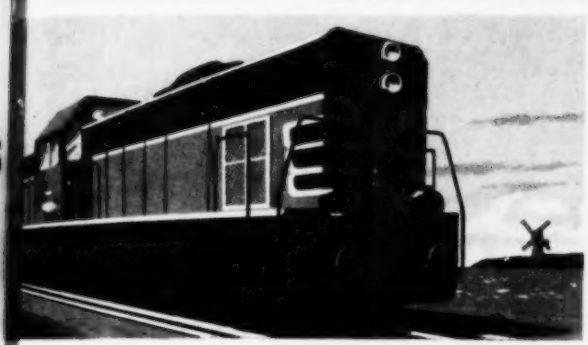
Now, throughout the world, history is repeating itself. Repeat orders for General Motors Diesel-Electric locomotives have been received from railways in nineteen countries on six continents.

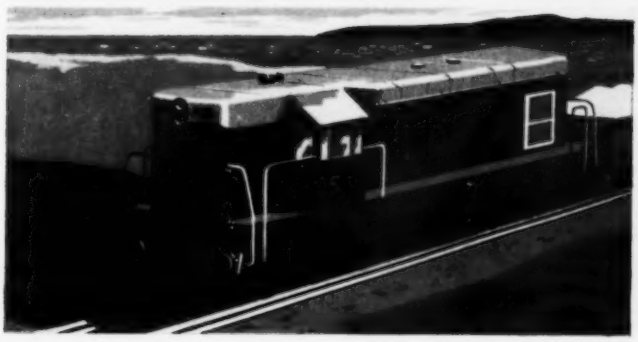
Here's the list: Australia, Brazil, Canada, Ceylon, Chile, Denmark, Holland, Hong Kong, Iran, Israel, Liberia, Luxembourg, Mexico, New Zealand, Norway, Pakistan, Saudi Arabia, United States, Venezuela.

There is no substitute for experience. And long years of railroad experience have proved that General









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Zahlreiche 1310 PS Bo-Bo Einheiten von General Motors bewältigen den hauptsächlichen I.S.R. Verkehr.
Las locomotoras Bo-Bo de 1310 CV constuidas por General Motors transportan la mayoría del tráfico de la I.S.R.

Iran: Railway Success Story

Can technologically undeveloped nations afford to dieselize their railways? Iran's experience indicates that they can't afford not to. Five years after the introduction of diesel road power, Iran's state railways have 199 diesel units, will soon expand the fleet to 251. Dieselization has increased freight car utilization by 78%; it has eased the strain of a doubled freight traffic and a tremendous surge in passenger travel. Locomotive costs per ton-kilometer are one fifth those of steam operation; the savings are enough to pay the cost of one diesel every month. The new diesels have set the pace for a system-wide modernization program undertaken with enthusiasm and forethought by Iran's railwaymen. Their efforts are producing impressive results in more efficient operation and a railway system that is growing both in size and capacity to meet the needs of an expanding national economy.

A total-dieselization program, now only five years old, has produced a paradox for the Iranian State Railways. Originally intended to replace all steam motive power, dieselization has instead increased traffic to the degree that even with 199 diesels four dozen steam locomotives are still required to meet the ISR's motive power needs.

Steam's reprieve will be a brief one, however. Fifty-two additional diesel units now contemplated will consign the four dozen to the scrap yards in a short time.

Iran's railway problem in 1955 was two-fold: to increase the traffic capacity of existing lines, and to complete vital new lines within the limitations of the country's economy.

Originally completed in 1938, after nearly ten years' construction, the main north–south line of the ISR covers a rugged 1381 kilometers from Bandar Shahpur, on the Persian Gulf, to Bandar Shah on the Caspian Sea.

On completion of the north-south line, work was immediately begun on three new lines: Tehran–Tabriz, Garmsar–Masshad, and Ghom–Yazd. The Tabriz and Yazd extensions were originally intended to form portions of an ambitious east-west trunk line linking the railway systems of India and Turkey. The Tabriz line, in addition, would form a link with the broad-gauge Azerbaijan Railway, originally built by Russian interests in 1916 to connect with the Russian system at Jolfa.

Although the Tabriz line was completed to Zanjan, and the Masshad line as far as Shahrud, by 1940, work on all extensions was halted when Allied forces took over the operation of the ISR in 1941 as part of the lend-lease supply line to the Soviet Union.

Subsequently the Tabriz line was extended to Mianeh (1943), and branches were built to Khorramshahr, on the Shat-al-Arab, and Tanuma, in Iraq (since abandoned), to provide additional port facilities for the Allied supply line.

Completion of the other projected lines, however, remained an important goal, to be carried out as soon as was economically possible.

Increased capacity for the existing lines was of vital and immediate importance by 1955. Large numbers of steam locomotives were in less than first-rate shape; tortuous mountain sections, with many tunnels and ruling grades of 1.6% on the Tehran-Andimeshk section and 2.8% on the northern section, severely restricted train tonnages and speeds. Traffic was further limited by the complete absence of any adequate signalling system.

Foreign technical advice was sought in 1955, and studies were made by specialists

first from the Swiss Federal Railways and then from the U.S. engineering firm of Coverdale and Colpitts. On the basis of recommendations by these advisers, though not without considerable debate, the decision was made to purchase diesel locomotives.

The General Motors G-12 unit, a 1310-horsepower roadswitcher, was selected, and through financing by the Export-Import Bank of Washington an order was placed for 70 locomotives.

The first 70 G-12 diesels went into service on the ISR in 1956, dieselizing freight service on the mountainous Arak-Andimeshk section, and all passenger service between Tehran and Khorramshahr. The economies were sufficient to persuade the Iranian government's Ministry of Roads—responsible for operation of the ISR—that total dieselization would be feasible, and an additional 50 G-12 units were purchased in 1958. These additions permitted dieselization of all passenger service and a majority of freight traffic; a published report in a railway periodical of about that time reported that not more than about 25 steam locomotives were still in service.

ISR officials have stated that without the diesels, the cost of fuelling stations, shops, and water supply in an arid land would have made the completion of the Mianeh–Tabriz and Shahrud–Masshad links economically impossible. As it was, the Shahrud–Masshad line was opened to service in May, 1957.

The Tabriz extension was more ambitious in some respects. Not only did it involve the completion of the line from Mianeh to Marageh (January, 1957) and from Marageh to Tabriz (April, 1958), but the narrowing of the Azerbaijan Railway from broad to standard gauge between Tabriz and Jolfa, and its branch to Sharef Khaneh.

These lines added to the total traffic of the ISR, and improved service made possible by the diesels produced an increasing demand on the older main line. By 1959 this increased traffic called for the purchase of still another 33 diesel-electric units.

The immense growth of passenger traffic—from 1,750,000 passengers in 1956 to 4,750,000 in 1959—called for not only more and faster trains, but an increase in length that increased the passenger train tonnage on the main line from 400 to 700 tons. In order to handle the heavier trains, the ISR departed from its reliance on the 1310-h.p. G-12 unit and purchased 20 1950-h.p. G-16s, changing the motive power on passenger trains from two G-12s in multiple to one G-12 and one G-16.

CONTINUED

IRAN: L'histoire du succès de ses chemins de fer

Les nations sous-développées peuvent-elles se permettre techniquement de dieséliser leurs réseaux ferroviaires? L'expérience de l'Iran montre qu'elles ne peuvent pas ne pas se le permettre. Cinq ans après l'introduction de la traction diesel, le chemin de fer de l'état Iranien possède 199 unités diesel et va bientôt porter ce chiffre à 251. La diesélisation a permis d'accroître de 78% la rotation des wagons; elle a soulagé le réseau de l'effort représenté par l'accroissement considérable du trafic marchandises—qui a doublé— et du trafic voyageurs. Le prix de revient de la tonne kilométrique en traction diesel ne représente que 20% du prix en traction à vapeur et l'économie est suffisante pour amortir le coût d'une unité diesel chaque mois.

Les nouvelles locomotives diesel ont entraîné les cheminots iraniens à entreprendre avec enthousiasme un vaste programme de modernisation. Leurs efforts montrent des résultats d'exploitation impressionnants et le système ferroviaire s'est accru à la fois en étendue et en capacité afin de pouvoir faire face aux exigences d'une économie nationale en pleine expansion.

International Railway Journal Octobre 1960 p. 42

IRAN: Eisenbahn – Geschichte des Erfolges

Können sich technisch unterentwickelte Länder die Verdieselung ihrer Eisenbahnen leisten? Die Erfahrungen in Iran zeigen, daß sie sich nicht leisten können, die Verdieselung zu unterlassen. Fünf Jahre nach Inbetriebnahme der ersten Dieseltriebfahrzeuge haben die iranischen Staatsbahnen heute einen Park von 199 Dieseleinheiten der in Kürze auf 251 ansteigen wird. Die Verdieselung hat den Güterwagenumlauf um 78% verbessert; sie hat die Belastung der Eisenbahn, die eine Verdoppelung des Güterverkehrs und ein gewaltiger Anstieg im Reiseverkehr mitsichbrachten, wesentlich erleichtert. Auf Tonnenkilometer umgerechnet betragen die Kosten für Diesellokomotiven ein Fünftel der für Dampflokomotiven. Die dadurch monatlich erzielten Einsparungen entsprechen ungefähr dem Preis einer Diesellokomotive. Die neuen Diesellokomotiven sind bahnbrechend für ein allgemeines Modernisierungsprogramm gewesen, das von den iranischen Eisenbahnern mit Begeisterung und Überlegung durchgeführt wird. Ihre Anstrengungen haben zu eindruckvollen Ergebnissen geführt, die sich in einer leistungsfähigeren Betriebsführung und dem Fortschritt einer Eisenbahn zeigen, die in Größe und Leistung mit dem Anwachsen der Wirtschaft des Landes Schritt hält.

International Railway Journal Oktober 1960 S. 42

IRAN: La Historia del Exitó Ferroviario

¿Pueden las naciones técnicamente subdesarrolladas dieselizar sus ferrocarriles? El caso de Irán prueba que no pueden permitirse el lujo de no hacerlo. Cinco años después de introducir los sistemas diesel, los ferrocarriles del estado iraniano tienen ya 199 unidades diesel, y pronto ampliarán este número hasta llegar a 251. Con la dieselización se ha aumentado en un 78% la utilización de los vagones de carga, se ha aliviado la presión de un tráfico doble de carga y se ha logrado un aumento increíble en el flujo de pasajeros. El costo de las locomotoras, por tonelada-kilómetro, es la quinta parte del de las de vapor, y este ahorro es más que suficiente para comprar una locomotora diesel todos los meses. Las nuevas locomotoras han marcado el paso de un programa general de modernización que ha sido iniciado con gran entusiasmo y visión por los ferrocarrileros del Irán. Sus esfuerzos están dando resultados imponentes, no sólo en el aumento de eficiencia del sistema, sino en la expansión necesaria para satisfacer la demanda de una economía nacional en continuo crecimiento.

International Railway Journal Octubre 1960 p. 42

New Line Construction Continues in North, East, West

The rest of the third purchase was made up of 13 G-8 units of 875 h.p. These lighter units are used for local freight and passenger service, and for switching at major terminals. In addition, all road units are employed in shunting between mainline runs to obtain full utilization.

Although the present dieselization program had its start in 1955, diesels were no novelty in Iran. Even before the operations of the U.S. Army Transportation Corps during the war, which were almost entirely conducted with Alco road-switcher units, the ISR had purchased 39 Davenport-Besler diesel-mechanical shunting engines as early as 1940, and even before the completion of the main line two diesel railcars of Swedish origin had operated in 1937.

Although the 39 Davenports remained on the property in 1955, their mechanical condition was deplorable; 25, in fact, were classed as being in scrap condition.

Perhaps the most startling part of Iran's modernization program is embodied in the history of those 39 locomotives. In 1955, with the exception of a few railwaymen who had worked with the U.S. railroaders during the war, Iran had no one familiar with diesel equipment. With the new diesels in 1956 a diesel locomotive school was established in Tehran, staffed by U.S.-trained personnel. To date the school has turned out 500 locomotive drivers and 450 electrical and mechanical technicians.

At the same time, diesel shop facilities for running repairs were established in Tehran, and soon for heavy repairs.

Today all 39 of the original Davenport shunting engines are back in full service, rebuilt from rail to roof in the ISR's own shops by ISR personnel.

To replace the original 180-h.p. engines the ISR forces installed new 250-h.p. Caterpillar D-337 engines. Four of the locomotives have been converted to hydraulic power transmission, and another five are scheduled for such conversion soon. A sidelight of the rebuilding was the conversion of one Davenport from standard to broad gauge; before this conversion the standard-gauging of the Tabriz-Jolfa line had left some isolated broad-gauge tracks in Jolfa serving the transfer depot, which had to be worked by rented Soviet locomotives.

Together with five newer Davenport shunters of the same design, and two three-axle Henschel diesel-hydraulics of 440 h.p., the Davenports make up the rest of the 199-unit diesel roster. To the 199 will be added 52 more G.M. diesel-electrics, according to present plans: 10 G-16s, 30 G-12s, and 12 G-8s; financing for the purchase of these units is now being negotiated.

For the provision of shop facilities the two locomotive running sheds at Tehran have been completely modernized for quick servicing of diesel power; a wheel-truing machine has been installed that permits restoration of flange contour and truing of the wheel tread without removing the trucks from the locomotive —an operation that reduces out-of-service time from 45 to 4 hours.

The main repair shop at Tehran has also been completely rebuilt for heavy repairs, a new electrical shop added, and all diesel repairs are now carried out in the Tehran shops.

The construction of new lines continues as time and finances permit.

The project of linking the main north-south line with the Northwestern Railway of Pakistan is gradually nearing completion. The line from Ghom to Kashan, 98 kms, has been open for several years. From Kashan to Bad, 65 kms, the track has been completed and the rails laid. On the remaining stretch of 312 kms from Bad to Yazd, the track bed has been completed and the laying of rails is under way.

At a less advanced stage are proposed extensions from Yazd to Kerman and to the port of Bandar Abbas in the south of Iran, and from Kerman to Zahidan near the Pakistan border. Ground and air surveys are now being carried out, but no date has been set for commencing the main construction work.

Of more immediate importance are two short but important lines now building and due for completion by the end of 1960: a 37-km branch from Bandar Shah to Gorgan, the center of an important agricultural area, and 40 kms from Sharaf Khaneh to Kara Tapeh, a step toward the eventual Turkish link.

A major obstacle to new construction and rehabilitation of some existing line has been economic. Iran presently has a serious foreign-exchange shortage resulting from exceptionally heavy imports in the last two years, and such necessities as crossties and rail have had to be imported. In a virtually treeless land wooden crossties are not locally available; over 56% of the present track is laid with steel ties.

Future requirements will be partly met by the 850,000 concrete sleepers of French design which are to be manufactured at a recently completed plant at Karaj at the rate of 1200 ties a day. This factory is now completing a lot of 200,000 ties for a track renewal project between Tehran and Arak.

Between Arak, Ghom and Tehran—a

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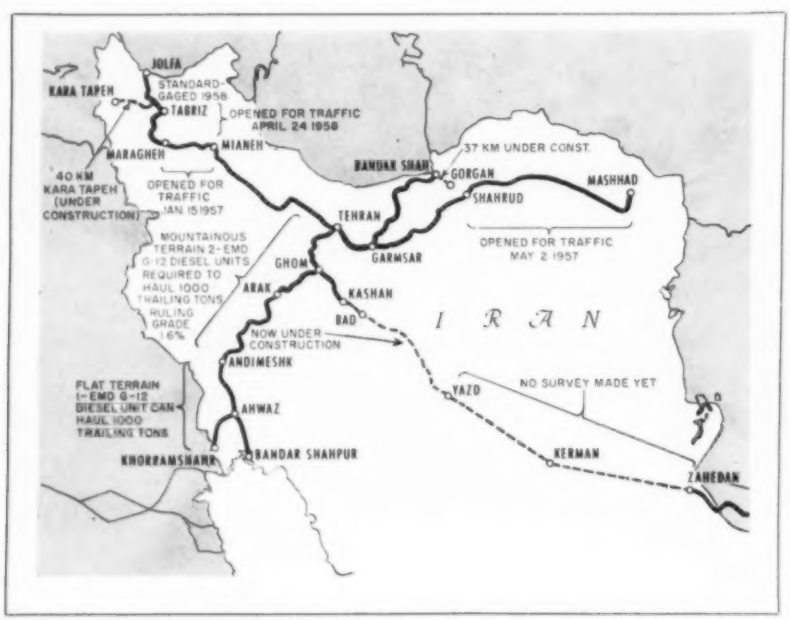

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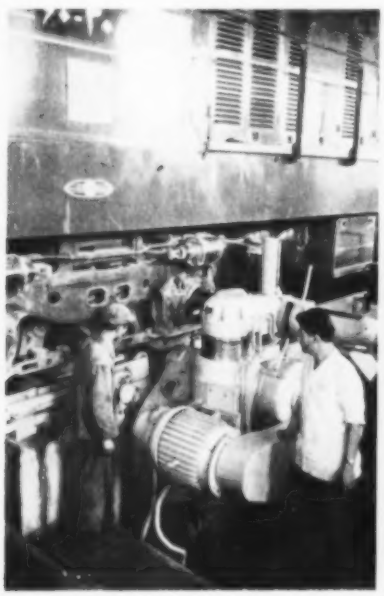
Modernization Keeps Traffic Moving, Revenues Rising

distance of 320 km—new rail with a weight of 46 kg per meter is being laid, replacing older 37-kg rail. All trackage is laid with opposite rail joints, following the practice of the line's original European builders. However, rail joints on some sections with numerous curves are being staggered, and a considerable amount of rail in the mountainous southern section has been field-welded, using the French-developed aluminothermic process.

Signalling has also taken an important place in the modernization of the line. Aside from a Russian type of staff or token control in use on parts of the Azerbaijan Railway, all despatching has been done through written train orders issued by station agents with the authority of telephone instructions from the divisional dispatcher.

Installation of a signalling system has been carried out in two stages. The first stage—provision of a positive but simple approach-warning system—was carried out by the installation of an automatic approach-warning and train-stop system in conjunction with fixed approach and speed-restriction signs. The equipment, designed and supplied by the Swiss firm Integra, Ltd., employs fixed permanent magnets located between the rails at a point allowing full braking distance to the location of the home signal, about one kilometer from the station entry switch.



Modern machinery in Tehran diesel shops keeps I.S.R. motive power running.
Les ateliers modernes à Téhéran permettent de maintenir la force motrice en opération.
Moderne Maschinen in Teherans Diesel-Werkstätten sorgen für laufende Lokkraft.
Los talleres modernos en Teheran permiten de mantenir en operación la fuerza motriz.

Receiving equipment installed on all road diesel locomotives is operated directly by the track magnet, and sounds a warning horn in the driver's cab, as well as lighting a blue proving lamp in the cab indicator. If the warning is not acknowledged and cancelled by the driver within three seconds, a service brake application is made immediately.

Control circuits are designed to provide "fail-safe" operation, and automatically prevent wheel-slip which might result from the driver's attempt to superimpose dynamic braking on the automatic brake application.

The second stage of the signalling program—the installation of color-light signals working in conjunction with the modified automatic train control—has just gone into operation, converting the Tehran-Khorramshahr section from train-order to positive manual block operation. Signal equipment has been supplied by Japanese and German firms. In connection with the signalling program a signal school, for the training of signal maintainers, station agents and locomotive crews, has been established in Tehran.

With the increasing traffic, additional rolling stock for both freight and passengers has been required. Part of the need is being met by increased utilization made possible by dieselization with its higher train speeds; before dieselization freight-car utilization was only 70 km per day. With the advent of diesel power the average has been raised to 125 km, and in the case of fuel-oil tank cars to 225 km daily.

Even with this increased utilization, however, 200 tank cars were recently purchased from the German firm of Linke-Hoffmann-Busch, and a further purchase of 1000 freight cars of various types is to be made in the near future.

Increasing passenger traffic led to the recent purchase of 260 passenger cars, also from L-H-B. Of these, 45 coaches

Iran's Diesel Roster

120 General Motors G-12s, 1310 hp for traction, Bo-Bo—road freight and passenger service.

20 G.M. G-16s, 1950 hp Co-Co—road service, principally passenger; used with G-12 in multiple.

13 G.M. G-8s, 875 hp Bo-Bo—local freight and passenger service, shunting.

2 Henschel six-wheel diesel-hydraulics, 440 hp, side-rod drive—shunting.

44 Davenport diesel shunting engines 250 hp:

- **39 rebuilt in Tehran shops from pre-war 180 hp units.**
- **4 converted from mechanical to hydraulic drive at Tehran.**
- **1 converted to broad-gauge for interchange shunting at Jolfa.**

Planned for 1961 delivery: 10 G-16s, 30 G-12s and 12 G-8s.

Success of I.S.R. modernization program rests on superior training in up-to-date Tehran diesel school.
Le succès du programme de modernisation de l'I.S.R. est basé sur l'enseignement excellent de l'école diesel à Téhéran.
Der Erfolg des I.S.R. Aufbauprogramms beruht auf gründlicher Ausbildung in modernen Dieselschulen Teherans.
El éxito del programa de modernización de la I.S.R. se radica en la enseñanza excelente de la escuela Diesel en Teheran.

and 16 dining cars are air-conditioned for use on deluxe express trains.

Availability of rolling stock has also been increased through an extensive overhaul and modernization of freight car repair methods. Using shop facilities made available by the retirement of steam power, I.S.R. has trebled the scope of its freight car repair program. Not only the surplus shop facilities, but surplus manpower released by the dieselization program, have been employed in the expanded car-repair program.

The use of former steam repair facilities makes possible the repair of freight cars at all major points on the railway system, reducing out-of-service time considerably.

New equipment is also being employed. Ultrasonic testing equipment is being used to test all car axles, making possible the detection of potentially dangerous flaws.

I.S.R. has also undertaken the production of many accessories and parts that formerly had to be purchased outside the country. Shop forces are now making many brass and cast iron parts, and an electric arc furnace to be installed shortly in Tehran will make possible the local manufacture of many kinds of steel parts and accessories.

As with many countries which must import railway equipment, Iran has hopes of eventually building its own rolling stock, especially freight cars. Although cars are now delivered in knocked-down form and assembled by ISR forces, any local manufacture must await the eventual production of locally-made steel.

Operating statistics of the ISR have shown a steady improvement, thanks both to the diesels and to prudent fiscal management. Total revenues during the past four years have increased from 2,260,000,000 Rials to 3,535,000,000, and the overall operating ratio has dropped to a healthy 68%.

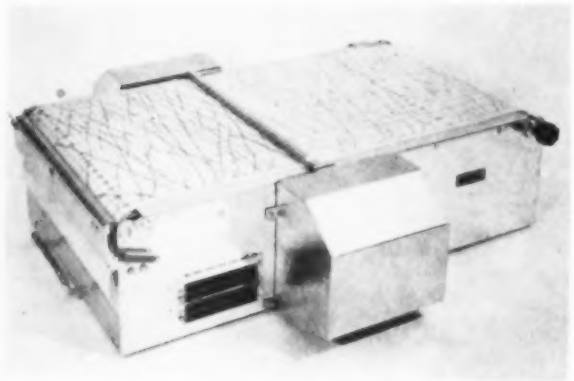
With the dieselization of the great majority of traffic, ISR forces estimate the cost of diesel operation per ton-kilometer at one fifth of steam operation cost. In spite of the high cost of diesel power and the lack of any appreciable salvage value for the retired steamers, it is estimated that savings from diesel operation are sufficient to pay for one diesel locomotive each month.

The past five years have been years of growth for the ISR, and the modernization program being carried out reflects vividly the Iranian Government's conviction that a sound rail transportation system is essential to the nation's economic growth.

ISR Vital Statistics

3365 kilometers of standard (1.435 m) gauge line.
92 kilometers of Indian broad gauge (1.676 m) line operated with equipment of Northwestern Railway (Pakistan).
New lines under construction from Bandar Shah to Gorgan, Sharaf Khaneh to Kara Tapeh, Kahan to Bad; extension planned from Bad to Yazd.
153 diesel-electric locomotives.
46 diesel-mechanical and diesel-hydraulic shunting locomotives.
253 steam locomotives on the roster; 48 in service.
441 passenger cars, including 66 air-conditioned.
5915 freight cars of all classes.
36809 employees.
2717 meters maximum altitude above sea level.
2.8 per cent maximum grade.
7.9 degrees maximum curvature.
3,535,278,042 Rials revenue in 1959; 2,393,383,038 Rials expenses.
68 per cent operating ratio in 1959.
2,084,012,139 passenger-kilometers, 6,563,835,832 ton-kilometers.

Products of Interest from R



Le "Traingraph" enregistre l'itinéraire des trains.
"Traingraph" (Zugschreiber) liefert gedruckte Zuglaufmeldungen.
El aparato "Traingraph" registra la marcha de los trenes.

Automatic Traingraph Produces Printed Record

Intended primarily for use with Centralized Traffic Control installations, the Traingraph can be used with any system that provides a remote indication of train passage. The 352 mm wide roll chart can be pre-printed with timetable diagrams, and provision is made for printing in different colors for different tracks or different directions of movement. 112 or 224 train-passage indicator circuits can be connected. *L. M. Ericssons Signalaktiebolag, Stockholm.* **IRJ 1**

On annonce une nouvelle machine à souder à courant continu.
Neue Seirion Gleichstrom Schweissmaschine auf dem Markt.
Nueva máquina para soldar, para corriente continua.

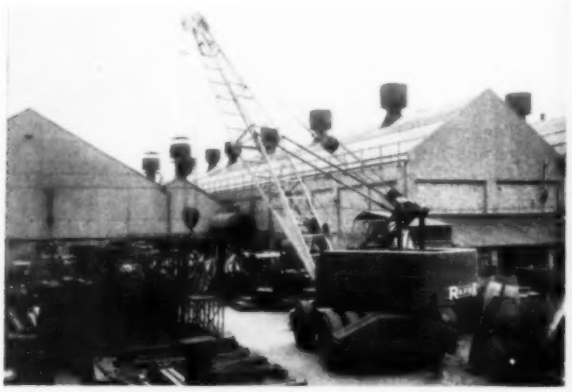
New D.C. Welder for Tungsten Inert-Gas Process

For use with a direct-current power source, the Seirion welding machine is designed specifically for the welding of stainless steel, nickle-chromium alloys, copper, and copper alloys by the tungsten inert-gas process. The Seiron welder provides automatic re-starting of the arc, and can be used in the field where alternating current lines are unavailable. *Saturn Industrial Gasses Ltd., Southall, Middlesex, England.* **IRJ 2**

Le clé pneumatique "Impactool" est de 91% plus rapide.
Neuer Druckluftschraubenschlüssel arbeitet 91% schneller.
La llave de tuercas neumática "Impactool": 91% más rápida.

New Heavy-Duty "Impactool" Pneumatic Wrench

The Size 810 Impactool pneumatic wrench features 91% faster rundown speed, compact design for increased maneuverability in cramped quarters. The 810 Impactool delivers 1000 impacts per minute, has a free-running speed of 4300 r.p.m., high torque for heavy-duty nut running. The tool has a 3/4-inch (approximately 19 mm) square drive as standard equipment, weighs approximately 5 kg. *Ingersoll-Rand Company, 11 Broadway, New York 4, N.Y.* **IRJ 3**



RapieR introduit un nouveau modèle d'un grue mobile.
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Mobile Crane Handles Up To 15-ton Loads

The RapieR 1520 diesel-electric mobile crane, designed for flexibility of operation and high maneuverability, handles up to 15 tons with a 9.15-m jib suitably blocked, up to 8 tons free on wheels. The crane employs a 61-h.p. Perkins diesel engine with independent electric drive for all crane action and travel operations, can be furnished with a wide variety of strut and cantilever jibs. *Ransomes and Rapier Ltd., P. O. Box No. 1, Waterside Works, Ipswitch, England.* **IRJ 4**

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L'arracheur de crampons "Fairmont" accélère la réparation des voies.
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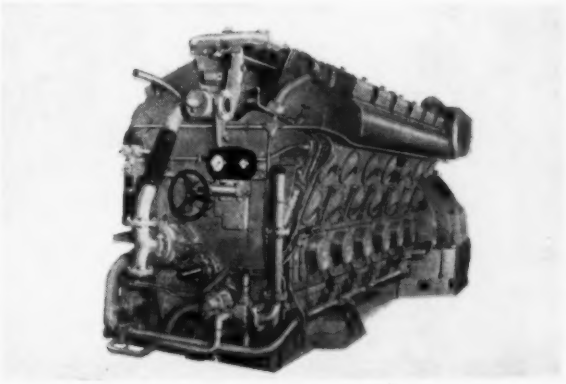
El aparato "Fairmont" acelera el arrancamiento de los clavos.

New Spike-Puller Speeds Track Maintenance

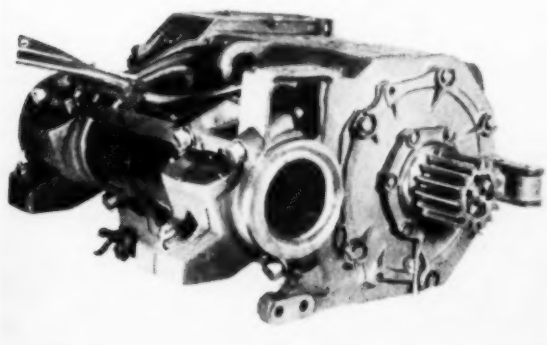
The Fairmont W84 Series C hydraulic spike-puller is available in all track gauges from 36 inches (.914 meters) upward. The spike-pulling mechanism is mounted on a transverse track and can be moved laterally to pull spikes from either rail. The W84 Series C spike-puller has a simplified hydraulic system with controls mounted on one of the hand grips. It can be set on or off the track by 2 men. *Fairmont Railway Motors, Inc., Fairmont, Minn., U.S.A.* **IRJ 5**



Le moteur diesel "Mirlees" amélioré a plus de C.V.
Mirlees verbesserter Dieselmotor mit höherer Leistung.
El motor diesel "Mirlees" tipo mejorado; más C.V.

Improved Diesel Locomotive Engine Delivers 1600 h.p.

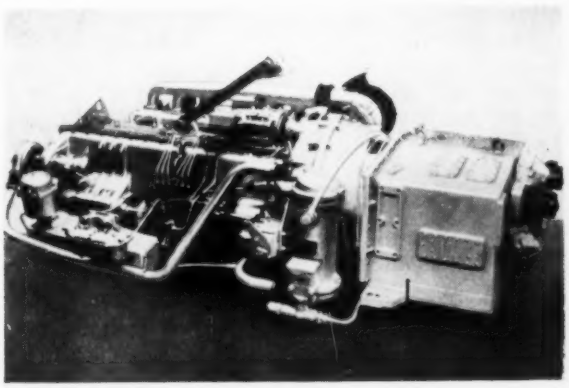
Oil piston cooling of the Mirlees JVST Mark II series diesel engines produces increased horsepower, the JVST 12 engine pictured delivering 1600 h.p. at 950 r.p.m. The four stroke V-12 engine is one of a series including 8-cylinder and 16-cylinder V-type engines and 4- and 6-cylinder in-line engines for diesel traction. *Hawker Siddeley Brush International, (Export Organization), Mirlees Works, Hazel Grove, Stockport, Cheshire, England.* **IRJ 6**



Nouveau moteur de traction pour courant continu redressé.
Für Wellenstrom wurde ein neuer 175 PS Triebmotor eingeführt.
Nuevo motor de tracción para corriente continua rectificada.

New 175-h.p. Traction Motor for Rectified A.C.

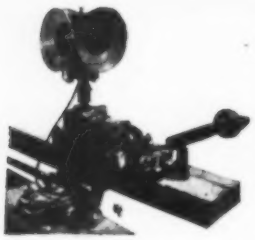
To be shown at the B.T.C. Electrification Conference (London, Oct. 3), the C.152 nose-suspended motor is designed for satisfactory operation on 750-volt rectified current with up to 30% ripple and 20% overvoltage, can also be used in dual-service equipment for industrial-frequency A.C. and 1500-volt D.C. working. Continuous rating, 175 h.p. at 1620 r.p.m. *Crompton Parkinson Ltd. Crompton House, Aldwych, London W.C. 1.* **IRJ 7**



Le nouveau moteur diesel de la motrice fournit 275 C.V.
Neuer Diesel-Triebwagenmotor mit einer Leistung von 275 PS.
Nuevo motor diesel "B.U.T." para automotores, 275 C.V.

New 275-h.p. Diesel Railcar Engine

Designed to meet increased power requirements, the turbocharged R.E.T.S. 902 L-type engine delivers 275 b.h.p. at 1800 r.p.m. The direct-injection, 4-stroke, 6-cylinder engine has a 15.7-litre displacement, bore and stroke of 140 mm × 165 mm, and compression ration of 15:1, produces 116 kg/m maximum torque at 1200 r.p.m., weighs approximately 1361 kg with oil and water. *British United Traction Ltd., 96 Piccadilly, London, W.1, England.* **IRJ 8**



A. No. 22 AUTOMATIC SWITCH STAND

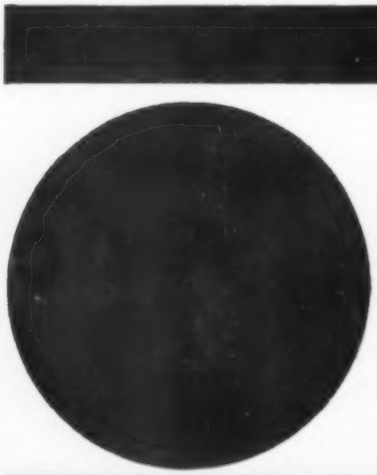
B. SOUTHERN CAST WHEEL

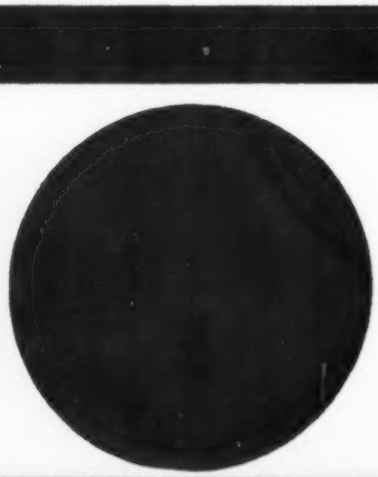
C. TYPE M VERTICAL SWITCH ROD

D. ABSCO LUBRICATING PAD

E. ABSCO FLAT BACK BEARING

F. DIAMOND S BRAKE SHOES





A. RACOR HEAVY DUTY AUTOMATIC SWITCH STAND. T
No. 22 switch stand avoids damage, delays, a
cost of re-railing in busy yards where switch
may be run through. Wheel flanges partly op
switch points and throw to opposite position
completed automatically. Operates through
use of eccentrics. Has large bearing surfaces
no gears to wear. Target lamp always sho
true position of points.

B. SOUTHERN CAST STEEL WHEEL. Designed to sta
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traffic. Cast of electric furnace steel to high
metallurgical standards. Hubs, bores, flang
and treads are precision machined. Easily bor
and mounted. Recommended for new cars a
maintenance.

B. SOUTHERN CAST IRON WHEEL. Proven for econo
and safety in general freight service. Chill
tread of extremely hard, wear-resistant, fi
grained iron. Plate and hub are of strong
silient gray iron with high damping properti
Hub is easily machined. Rim and flange a
reinforced for extra strength.

C. RACOR TYPE M VERTICAL SWITCH ROD. The Type
vertical rod increases switch rigidity and mak
switches easier to operate manually or from
tower. Correct position of switch points a
positive contact for signal operation are a
sured. Extra large journals and bearings perm
easy operation without strain on rods.

D. ABSCO LUBRICATING PAD. Distributes a steady flo
of oil over the entire journal. Twisted lo
chenilling, special center design, and foam ne
prene cores give highest wicking action a
resilience. Easily installed in standard journ
boxes. Reversible for long life under extre
service conditions.

E. ABSCO FLAT BACK BEARING. This new design be
ing greatly improves the performance of t
standard journal bearing assembly *at low co*
The flat back bearing greatly limits later
movement of the journal within the box.
eliminates the need for journal stops, reduc
impact forces, and resists displacement of be
ing and axle. It also protects the dust guar
helps cut oil consumption, and improves lub
cator performance.

F. DIAMOND S BRAKE SHOES. These famous bra
shoes . . . the best you can buy . . . combi
maximum braking efficiency with low cost
service. They are engineered for optimum fr
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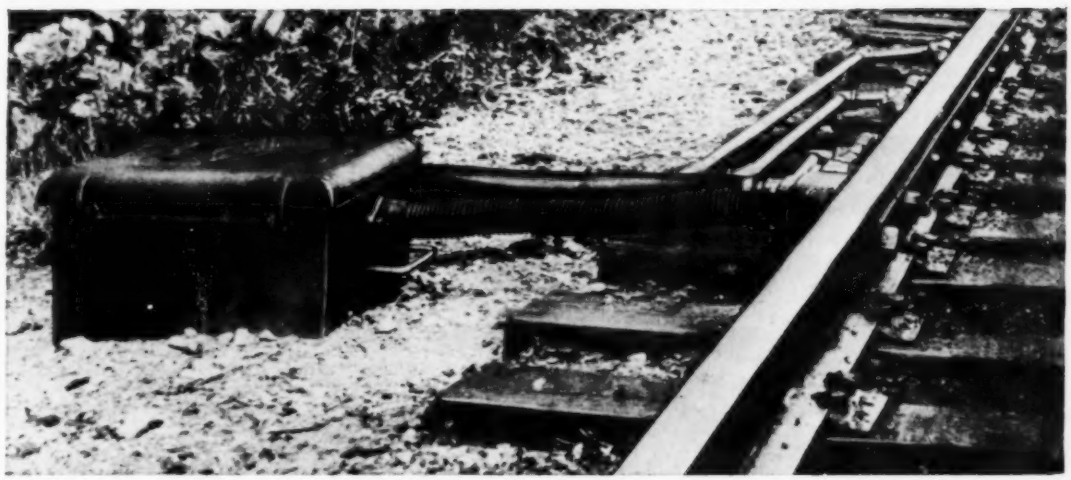
100,000,000 ft-lbs. of braking work. Spec
metallurgy, steel back reinforcing, and e
panded metal cores assure long, even wear-
down to ⅜ inch. Ends are chill hardened
resist wear resulting from misalignme
Prompt delivery.

Why so many railroads specify Racor® for efficient, low-cost wheel flange and track lubrication!



For big savings from reduced wheel flange wear, less rail wear, and far less track maintenance. The greater efficiency of Racor Lubricators helps you save more . . . while cutting lubrication costs below that of any other lubricator. Here's why:

Positive, even lubrication! Racor lubricators distribute lubricant through six strategically located delivery points in a thin, even line that extends over 100 inches—enough to lubricate the entire flange of a standard car wheel.

Efficient . . . No waste lubricant! A measured amount of lubricant is pumped *every time a wheel passes.* The flow of lubricant is constant, regardless of the speed of the train. Racor lubricators actually *do more work* than other lubricators! There are no wasted blobs of lubricant to be thrown up on the head of the rail to cause slippage.

Trouble-free, adjustable plunger! Plunger, depressed by wheel, actuates pumps on *up stroke only* . . . for less wear on parts. Plunger is adjustable and can be set for the average condition of wheels on your system. Plunger housing is set down so that it cannot be contacted by wheels no matter how track is worn.

Recessed plates cannot be damaged! Lubrication plates are recessed into the head of the rail . . . out of the way . . . where they cannot be smashed by wheels. This design eliminates a costly troublespot common to many lubricators.

Big (250 lbs.) lubricant capacity . . . Fewer refills! Holds enough lubricant for 100,000 8-wheel cars or 200,000 4-wheel cars . . . and the Racor Lubricator is easy to fill.

Long-life pumps and parts! Racor Lubricators have 3 dependable gear-driven pumps. *No pump has ever been replaced in over 25 years of service.* Pump action breaks up concentrated deposits of graphite and assures even distribution of graphite throughout the lubricant. All Racor Lubricator parts are of simple, sturdy design and work in one direction only for longer life. *There are no reciprocating parts to shuttle back and forth with double the wear and frequent replacement.*

Lowest part replacement cost . . . by record! Experience has shown that Racor Lubricators cost only 1/10th as much to maintain as other lubricators. There are far fewer parts to replace, and the sure, dependable operation and big capacity of Racor Lubricators cut down the time and money you have to spend for lubrication.

The big savings come through efficient wheel flange and track lubrication. Less wheel flange wear! Less rail wear! Less track maintenance! But remember, there's a big difference in lubricators. First cost is only a small part of the story. To get the full savings possible from efficient wheel flange and track lubrication . . . at lowest overall cost, get a Racor Lubricator.

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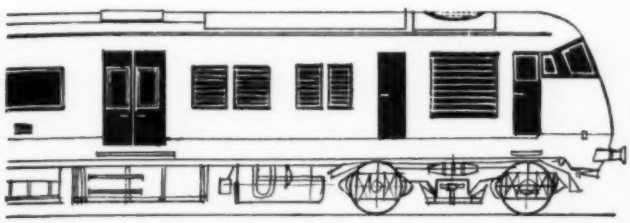

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for diesel engines in precision-cast aluminium.

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P.5395

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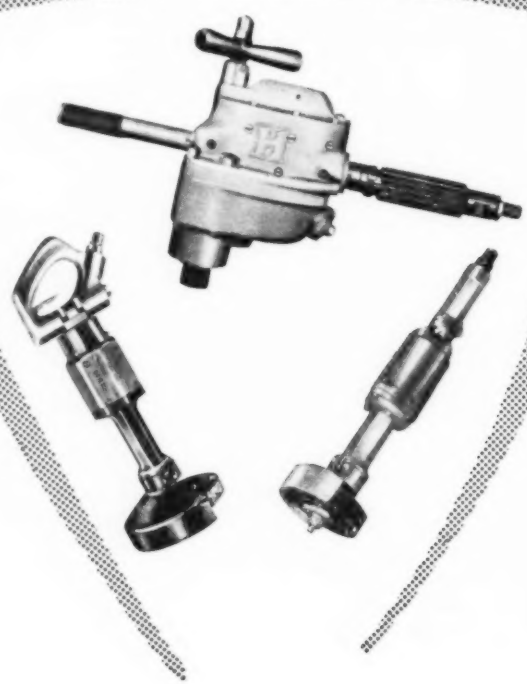

. . . pneumatic equipment of every description built for hard wear and hard work on the railway. There are 70 types of pneumatic tool—powerful, light and versatile. There are portable rotary screw compressors with outputs up to 600 c.f.m.
Write for catalogue 55/G.P.1

Matériel pneumatique de tous genres construit pour travaux durs à forte usure des chemins de fer. Il y a 70 types d'outil pneumatique disponibles—puissants, légers et d'emploi universel. Il y a des compresseurs portatives à hélice tournante donnant des débits jusqu'à 600 c.f.m. (=17m³/min).
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Pneumatische Geräte aller Art fur schwere Arbeiten bei der Eisenbahn. 70 verschiedene Arten von pneumatischen Werkzeugen vorhanden—kräftig, leicht und allgemein verwendbar. Ortbewegliche Drehschrauben-Verdichter mit Leistungen bis zu 600 c.f./m. erhältlich. (17 cbm/min.)
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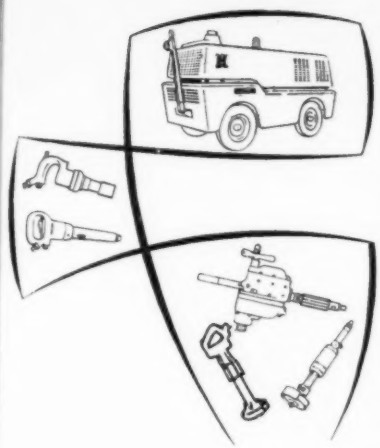

There is no substitute for Holman design and craftsmanship. All Holman products quickly prove their capacity for continuous hard work without breakdown under the toughest conditions.

Holman Brothers Limited of Camborne, England, and their associate companies have agents and representatives throughout the world.

La construction et l'exécution "Holman" ne sauraient être remplacés. Tous les produits "Holman" donnent preuve très vite de leur capacité de servir pour des travaux durs et continus sans pannes même sous les conditions les plus onéreuses.

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THE HOLMAN GROUP

World Market CONTINUED

▶ *German-Liberian Mining Co. (DELIMCO).*—Plans construction of a railroad from the Bong Range to the Free Port of Monrovia, Liberia, for exploitation of iron ore deposits. Ore exports are expected ultimately to be 5,000,000 tons annually. Engineering studies for the railroad, conducted by Grun & Bilfinger of Mannheim, Germany, were expected to be completed by the end of September.

▶ *Guinea.*—Plans to rebuild the 662-km Conakry-Kankan meter-gauge rail line with assistance from the Soviet Union.

▶ *Indian Railways.*—Will purchase 60 mainline meter-gauge diesel locomotives, 40 broad-gauge mainline diesels and 30 broad-gauge diesel shunters, all fully assembled; an additional 40 broad-gauge mainline locomotives are to be acquired for partial assembly in India. The diesels are to be acquired through a $50 million (U.S.) loan from the Development Loan Fund, a U.S. government agency; an unspecified number of electric locomotives and centralized traffic control equipment for two meter-gauge lines of the Northeast Frontier Railway are also to be purchased with proceeds from the DLF loan.

▶ *Iraqi Republican Railways.*—Will award a contract for the construction and six months operation of a plant for the manufacture of standard-gauge prestressed concrete sleepers. The plant is to have a capacity of 500 sleepers daily, and specifications call for a plant which can be converted to the manufacture of concrete structural elements when desired. The railway administration earlier announced plans to convert the meter-gauge Baghdad-Basra line to standard gauge over a period of years. The railway now consists of 528 km of standard-gauge and 1162 km of metric line.

▶ *National Iron Ore Co., Liberia.*—Has secured financing for the development of iron ore deposits in the Mano River area, including the purchase of railway equipment.

▶ *New South Wales Government Railway.*—Asked bids for the construction of 120 steel multiple-unit trailer cars for use in electrified suburban and subway service. NSWGR has also asked bids for design and construction of a 180-ton capacity special flat car. The car will be the heaviest in use in Australia.

▶ *Peru.*—Has reached an agreement with Mitsubishi Shoji Company of Japan for railway construction and equipping of a 45-km rail line between Cuzco and Quillabamba in southern Peru. The package agreement—reported to be the first complete railway export package since World War II for Japan—is to include 66 railway cars, rail, bridge girders and other material, and engineering and construction of the line. Formal signing of contracts was scheduled to take place as soon as the agreement was approved by the Peruvian Congress.

▶ *Rhodesia Railways.*—Will call for tenders on a worldwide basis for 40 passenger coaches (15 third-class, 25 fourth-class). Fiberglass and plastics will be widely used in the new cars.

(Continued on page 57)

HOW YOU CAN CLASSIFY CARS BETTER with a GRS EQUIPPED GRAVITY YARD

Rolling cars into their classification tracks by gravity is accepted—throughout the world—as the most effective method. GRS equipped yards classify five cuts per minute—in any weather. One yard reduced classification time 66⅔; others reduced time 50%. Benefits include fewer locomotives required, protection of cars and lading, and greater availability of cars throughout the railroad.

CORRECT COUPLING SPEEDS are ensured by all-electric car retarders. Retarders are available with either automatic or with manual control. Class-Matic®, the GRS automatic control system, uses electronic sensing and computing devices to obtain safe, uniform coupling speeds.

SWITCHING IS AUTOMATIC, the operator presses one button for each cut of cars. One man does all the classification switching for even the largest yard.

CLASS-MATIC IS FLEXIBLE, it can be applied to achieve any of varying degrees of automation. You can have complete automation or simple speed control. Manual control is also available. There is a complete range of GRS yard control facilities—together with experienced engineering services—to meet your particular needs.

Your GRS representative can give you further information; he can arrange for studies and estimates.

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RESUME

La méthode considérée partout comme la plus efficace est de diriger les wagons sur leurs voies de triage par la gravité. Les chantiers équipés par GRS trient cinq coupes à la minute, par tous les temps. Dans un chantier le temps de triage fut réduit de 66⅔; dans d'autres, de 50%. Les avantages sont: moins de locomotives, meilleure protection et plus de wagons disponibles. Des vitesses correctes d'attelage sont assurées. On n'a besoin que d'un homme pour presser le bouton.

RESUMEE

Die Wagen auf Verschiebebahnhöfe mit Ablaufbetrieb fahren, wird überall als die wirksamste Methode angesehen. Die Bahnhöfe welche durch GRS ausgerüstet sind, rangieren fünf Abschnitte pro minute, in jedem Wetter. So hat ein Bahnhof seine Rangierzeit um 66⅔ verringert, andere um 50%. Die Vorteile sind: weniger Lokomotive, bessere Beschützung, und es stehen mehr Wagen zur Verfügung. Korrekte Kupplungsgeschwindigkeiten sind gewährleistet. Ein Mann allein kann die Arbeit mit einem Druck auf den Knopf verrichten.

RESUMEN

Cómo clasificar mejor los carros con equipos GRS en el patio de gravedad.

La opinión general en todo el mundo es que no hay método de clasificación màs efectivo que el de rodar los vagones en sus respectivas carrileras de clasificación, y en los patios equipados con instalaciones CRS se pueden hacer 5 clasificaciones por minuto, haga buen tiempo o no. En un caso se logró reducir en un 66⅔ el tiempo de classificación requerido; en otros patios se ha reducido el tiempo de clasificación a la mitad. Las ventajas derivadas incluyen el requerir menos locomotoras, el tener mayor protección para los vagones y la carga, y el lograr una mejor utilización de los vagones en todo el ferrocarril. Factor muy importante es la garantía de hacer los acoplamientos a la velocidad correcta, lo que puede lograr un solo operario sin más que apretar un botón.

GENERAL RAILWAY SIGNAL COMPANY

World Market CONTINUED

▶ *Queensland Railways.*—Awarded a £2.3 million (Australian) ($5.2 million U.S.) contract for the first stage of the 1200-km (750-mile) Mt. Isa rehabilitation project to a group of four Australian, U.S. and New Zealand firms. The syndicate, headed by M. R. Hornibrook of Australia, includes Henry J. Kaiser Corp. of California, Fletchers Constructors of New Zealand, and Davis Contractors of Sydney, N. S. W. Ford, Bacon and Davis of New York, consulting engineers, will supervise engineering and manage construction for the project. The contract covers 387 km (242 miles) of track from Richmond to Duchess; 89 km (55 miles) of new route are to be built to provide easier grades and permit bridge replacement, and the majority of the more than 300 timber bridges on the section will be replaced with concrete spans or culverts. The 21-kg rail now in use will be replaced by 41-kg (82-lb) rail.

▶ *Soviet Railways.*—Concluded an agreement with Japan's Taikoku Rolling Stock for eight diesel railcars and sixteen railcar trailers. The purchase—reported to be the first substantial Soviet-Japanese railway-equipment deal during 1960—raises hopes in Japan for further Soviet purchases from local builders. It is not stated where the equipment is to be used; previous Japanese rolling-stock sales to the U.S.S.R. have been primarily for the 1.067-meter gauge Sakhalin system.

▶ *State Railway of Thailand.*—Will receive 100 meter-gauge high-side bogie gondola cars from Australia as a gift under the Colombo Plan. The 12.2-m, 40-ton cars are to be built by Commonwealth Engineering.

▶ *Swedish State Railways.*—An order has been placed with Rolls-Royce for diesel engines and torque converters to power 50 new single-engined shunting locomotives to be built for the Swedish State Railways by Kalmar Verkstade A.B. The engines will be the turbocharged eight-cylinder type.

▶ *Syria.*—Will receive aid from the U.S.S.R. amounting to approximately £165 million (Syrian) ($45 million U.S.) for the construction of the Latakia-Aleppo-Qamishli railway line and other development projects. Total length of the new line is to be 764 km, and total cost has been estimated at £400 million (Syrian). The line will require 9 km of tunnels and 32 bridges.

▶ *United Arab Republic.*—Will purchase 100 General Motors diesel-electric locomotives with a $22.5-million credit from the Export-Import Bank of Washington. The credit, announced Sept. 16, will be repaid over a period of eight years commencing in May, 1962.

▶ *Viet Nam.*—Will purchase 23 950-h.p. diesel-electric locomotives and 64 passenger and freight cars (three sleeping cars, four first-class coaches, 26 third-class coaches, two dining cars, 25 freight cars, four baggage, mail, and express cars) with proceeds of a $9,700,000 loan from the Development Loan Fund (U.S.). Equipment will be placed in service on a 688-mile line between Saigon and Dong Ha. Procurement will be made in the U.S.A.

DANISH STATE RAILWAYS

Total: 153.4 million kroner*

Locomotives	36.0 million kr.
Passenger cars	11.3 million kr.
Freight cars	9.6 million kr.
Total rolling stock	56.9 million kr.
New line construction	37.2 million kr.
Major track improvements	11.2 million kr.
Signalling	2.7 million kr.
Yards and terminals	29.9 million kr.
Shops and repair facilities	2.0 million kr.
Ferries	13.5 million kr.
Total other expenditures	96.5 million kr.

* 100 kroner = $ 14.47 U.S.

THE SWEDISH STATE RAILWAYS

Total: 321 million crowns*

Locomotives	36.5 mil. crowns
Passenger cars	45.0 mil. crowns
Freight cars	55.5 mil. crowns
Total rolling stock	137.0 mil. crowns
New line construction	18.8 mil. crowns
Major track improvements	32.6 mil. crowns
Signalling	27.8 mil. crowns
Communications	6.7 mil. crowns
Yards and terminals	47.3 mil. crowns
Shops and repair facilities	9.8 mil. crowns
Other improvements	41.0 mil. crowns
Total other expenditures	184.0 mil. crowns

* 100 crowns = $ 19.33 U.S.
Figures are for current fiscal year (ends June 31, 1961).

EAST AFRICAN RAILWAYS AND HARBOURS

Total: £ 4,385,000*

Locomotives	£ 84,000
Passenger cars	£ 221,000
Freight cars	£ 244,000
Total rolling stock	£ 549,000
New line construction	£ 1,941,000
Major track improvements	£ 1,269,000
Signalling	£ 8,000
Communications	£ 55,000
Yards and terminals	£ 10,000
Shops and repair facilities	£ 170,000
Buildings and structures, etc.	£ 383,000
Total other expenditures	£ 3,836,000

* £ 100 = $ 280 U.S.

TAIWAN RAILWAY ADMINISTRATION

Total: $ 10,630,850 (U.S.)

Locomotives	$ 5,650,000
Passenger cars	$ 1,721,000
Freight cars	$ 918,000
Total rolling stock	$ 8,289,000
Signalling	$ 1,250,000
Shops and repair facilities	$ 791,850
Track improvements	$ 300,000
Total other expenditures	$ 2,341,850

FINNISH STATE RAILWAYS

Total: 22,920 million finmarks*

Locomotives	4,639 mil. finmarks
Passenger cars	577 mil. finmarks
Freight cars	1,300 mil. finmarks
Total rolling stock	6,516 mil. finmarks
New line construction	2,950 mil. finmarks
Major track improvements	7,240 mil. finmarks
Signalling	590 mil. finmarks
Communications	1,300 mil. finmarks
Yards and terminals	970 mil. finmarks
Shops and repair facilities	260 mil. finmarks
Bridges, buildings, etc.	3,094 mil. finmarks
Total other expenditures	16,404 mil. finmarks

* 100 finmarks = $ .315 U.S.

VICTORIAN GOVERNMENT RAILWAYS

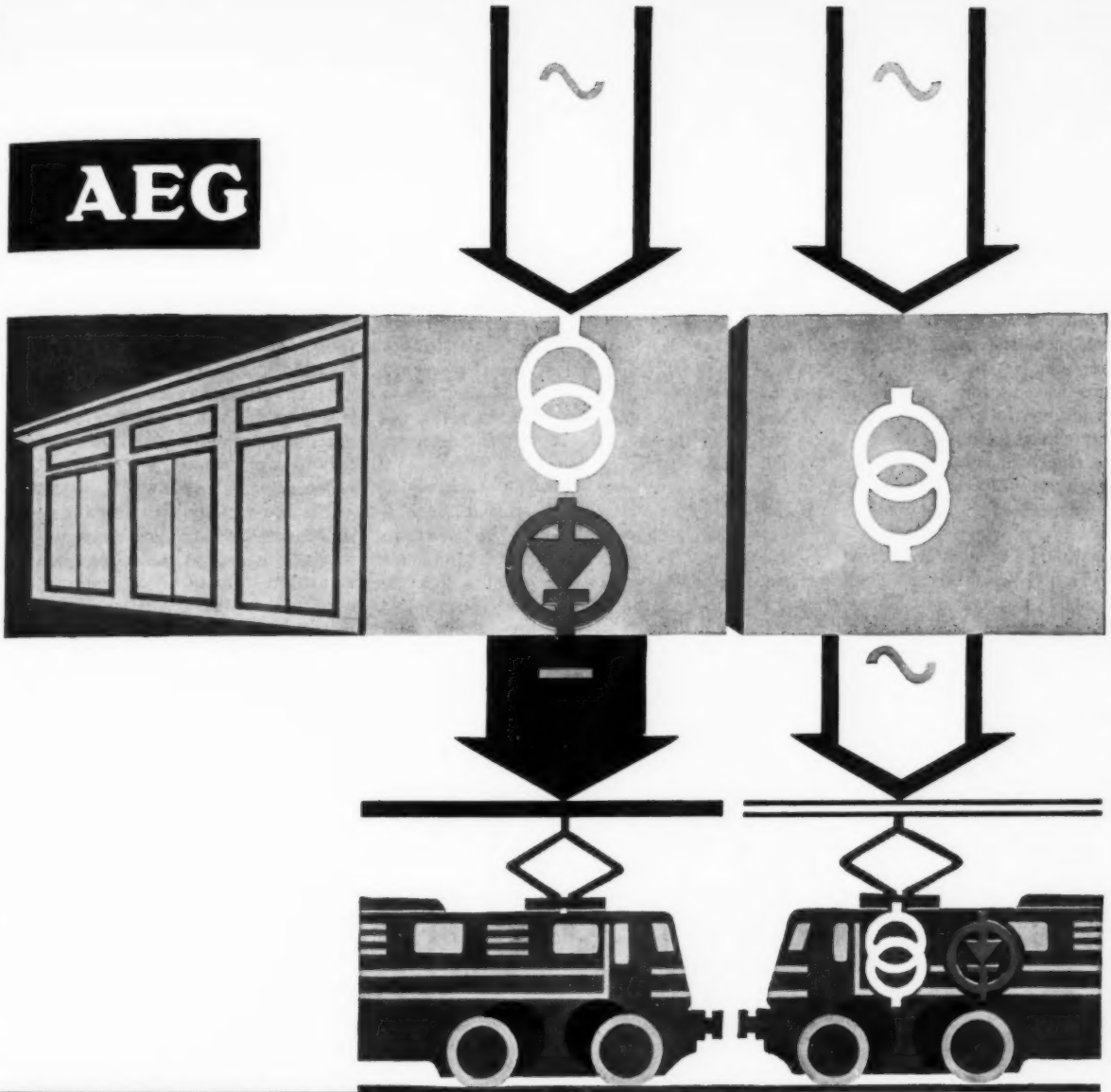
Total: £A 8,000,000*

Locomotives	£A 1,000,000
Passenger cars	£A 1,500,000
Freight cars	£A 670,000
Total rolling stock	£A 3,170,000
New line construction	£A 78,000
Major track improvements	£A 2,795,000
Signalling	£A 200,000
Communications	£A 37,000
Yards and terminals	£A 620,000
Shops and repair facilities	£A 1,100,000
Total other expenditures	£A 4,830,000
Proposed new line**	£A 4,550,000

* £A 100 = $ 225 U.S.
** Not included in total expenditures.

(Continued on page 65)

AEG



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Higher output voltages
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Unsurpassed performance
Simple and compact
Stable in operation
Long life

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ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT

Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)

 CONTINUED FROM PAGE 25

largest fleet of mechanical cars in the U.S.—about 2,700.

● Railways and car-line companies themselves have not been idle, meanwhile, in seeking a sound economic basis from which to acquire mechanical units. Most of the new cars are so-called "all-purpose" units which have a wide range of temperature settings available. The time required to bring temperatures down to the required level for loading has been shortened. Increased capacity has been obtained, largely by ordering cars of 15-meter instead of 12-meter inside length. And with the added capacity available, incentive rates have been developed to encourage heavier loading by shippers. By keeping their mechanical units on the move, and loaded to capacity wherever possible, the railways can better justify the increased investment required.

Thus, the conditions which effectively slowed the acquisition of mechanically-cooled vehicles have begun to change. With what effect? Estimates are now being made that, by 1970, ownership of such cars will exceed 25,000. When and if that occurs, as now seems probable, the railways and car-line companies will be thrust into a position comparable to that which arose in their now-completed conversion from steam to diesel motive power. As the diesel fleet grew, it became imperative to dieselize completely in order to get the potential savings from elimination of enginehouse, coal, water and ash-handling facilities.

Similarly, as the mechanical refrigerator fleet increases, the need for present icing stations and ice-handling facilities will shrink. The point will be reached when it will be economically desirable to abandon facilities and complete the mechanization of the entire refrigerator car fleet.

Already, one condition exists which provides incentive for change. That is the shortage of ice itself. With both commercial and home refrigeration now provided mechanically, the once-flourishing ice business has declined sharply. At many locations today, ice for refrigerator cars can be supplied from only one source. This creates both a supply and a price problem.

It is understandable that production facilities are being kept busy. For example, Pacific Fruit Express shops at Los Angeles, Calif., are presently producing mechanical units at the rate of five per day—part of a 1,000-car order scheduled for completion later this year. These are 15-meter units, designed for "all-purpose" service. Lading temperatures can be held at any setting between –23° and 57° C.

Light weight of each new PFE car is 39,144.8 kg, and maximum load limit is 55,655.5 kg. The cars will handle not only frozen foods but perishable lading as well. They will be assigned to general merchandise traffic where necessary to avoid empty movement back to origin points.

The car's body is a semi-envelope design with circulation of refrigerated air in channels around the lading space. A controlled volume of cool air can be admitted to the lading area through ceiling vents. Lading dividers are being installed, both to protect against damage in transit and to minimize loss of chilled air from inside the car if partial unloading is required at any point.

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Underframes are welded assemblies, incorporating cast-steel end underframe units. Sides are welded, with exterior side posts. This side post design allows more uniform installation of insulation material between exterior and interior walls.

End sections are unusual in that each car has, in effect, three ends. Full structural characteristics are incorporated in the bulkhead between machinery and the lading space, as well as in the exterior end at the opposite end of the lading space. The exterior end which comprises the outer wall of the machinery space is less rugged, since it serves only to enclose the diesel engine and refrigeration equipment.

Welding of sides, ends, underframe and roof carlines creates a single unit body.

Doors in the sides are designed for maximum tightness, and are 2.43 meters in width. A door of this width is entirely suitable for mechanized loading and unloading.

Insulation in side walls and floor is 17.5 cm thick, roof insulation 25.4 cm.

The new PFE units are equipped with diesel engines which have speed actuating devices that allow two-speed operation. One group of cars is equipped with the Witte 100 RDS Model E engine, the others with the Detroit Diesel Series 2-53 engine. Each engine runs at peak speed until lading space temperature comes within 2 deg of the thermostat setting. The engine then slows to low speed.

Each car carries fuel tanks of 1,892.7-liter capacity. The refrigeration system includes a 10-h.p. compressor, a 1½-h.p. condenser fan motor and a ¾-h.p. evaporator fan motor. The electric heating cycle is activated when lading space temperature goes 2 deg below the thermostat setting if the thermostat is set at —6.5° C. or above. Electric defrosting is activated by an air pressure differential switch which operates when the evaporator has sufficient ice buildup.

COMING . . . .

- Conference Reports: London, Rio, Tokyo
- New Equipment Review
- Canada Surveys a New Railway

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International Railway Journal
January 1961

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RÉSUMÉ

Un chemin de fer en Australie est aussi proche d'une source d'approvisionnement de Poor & Company, qu'un train à New York. Ceci, grâce à nos entrepôts établis sur les cinq continents. Depuis des dispositifs d'angrace de rails et des joints de rails jusqu'aux engrenages de traction et aux graisseurs de rails, les produits de Poor & Company sont utilisés dans tous les pays. Nos services et nos produits sont considérés essentiels aux voies ferrées modernes. Consultez-nous!

RESUMEE

Jede Eisenbahn, ob in Australien oder New York, hat ein Bezugslager von Poor & Company in ihrer Nähe. Dies wird durch unsere auf den fünf Kontinenten vorhandenen Lager ermöglicht.

Von Schienenklemmen bis zu Schienenstössen, von Zuggetrieben bis zu Schienenschmierapparaten, — in allen Ländern werden diese Poor & Company Erzeugnisse von den Eisenbahnen verwendet.

Unsere Erzeugnisse werden als wesentliche Bestandteile der modernen Eisenbahnen angesehen. Wenden Sie sich an uns für weitere Auskunft!

RESUMEN

Dondequiera que haya ferrocarriles
la distribución internacional de los productos
de la Poor & Company cubre el mundo entero

Cualquier ferrocarril en Inglaterra, Australia o la India, puedo obtener los productos de la Poor & Company con la misma facilidad que los de Chicago, Nueva York o san Francisco. Esto es posible por la red internacional de esta firma, incluyendo subsidiarias y distribuidores en el Canadá, México, Centroamérica, Sudamérica, Inglaterra, Francia, Africa, India y Australia.

Los productos de la Poor & Company, ya sean anclajes y juntas de rieles o trenes de tracción y lubricadores, son extensamente usados por las empresas ferroviarias del mundo entero, las que han llegado a considerar nuestros productos y servicios como factores esenciales en los ferrorcariles modernos. Pida información.

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Railway Conferences

BTC ELECTRIFICATION CONFERENCE

London, October 3—October 7

Railway electrification experts from throughout the British Railways, and visitors from 35 different organizations in 25 countries throughout the world, will gather at the Institution of Civil Engineers, Westminster, during the first full week in October to hear discussions of various aspects of alternating-current electrification.

Formal opening sessions on Monday, October 3, will be followed by discussion of some 40 technical papers presented by members of the BR staff and the staffs of British manufacturers.

Eleven papers will be read before the delegates; subjects include the choice of the 50-cycle system; testing; locomotive design; railcars and trainsets for A.C. traction; power supply; overhead line installation and design; civil engineering requirements; signalling and communications problems and interference; and research for A.C. traction. A summing up will be presented by R.C. Bond, technical adviser to the sponsoring British Transport Commission.

An additional 30 papers dealing with more specialized aspects of electrification will be printed and discussed, but will not be formally read.

Wednesday, October 5, and Friday, October 7, have been set aside for visits to A.C. installations of the British Railways. On Wednesday delegates will visit the newly-completed Manchester-Crewe electrification of the BR's London Midland Region. Friday's visits will cover electrified lines in and around London, and will include a visit to the electric train servicing and maintenance depot at Ilford, where electric rolling stock in use on lines inspected will be exhibited.

On Friday evening delegates will be entertained at Guildhall in London by the British Electrical and Allied Manufacturers' Association and the Locomotive and Allied Manufacturers' Association of Great Britain, who have joined in the sponsorship of the conference program.

Manufacturers will also conduct an exhibition of electric traction equipment at Battersea from October 3 through October 9.

X PAN AMERICAN RAILWAY CONGRESS

Rio de Janeiro, October 11—October 27

Brazil's railways will play host to railwaymen from throughout the western hemisphere at the X Pan American Railway Congress.

Technical sessions, visits to railway installations, technical films, and exhibits of railway equipment will provide the opportunity for extensive exchange of information between railwaymen from North and South America.

On Thursday, October 20, delegates will leave Rio de Janeiro for Sao Paulo, where the International Railway Equipment Fair will be held in conjunction with the congress. After visits to railway installations near Sao Paulo, delegates will journey by air to Brazil's new capital city, Brasilia, for the closing session of the congress.

ASIAN RAILWAY CONFERENCE

Tokyo, October 11—October 21

The Second Asian Railway Conference, sponsored by the Japanese National Railways and by trade associations and other government agencies, will bring railway officers from 12 Asian nations to Japan for 11 days of discussions, exhibitions, and technical visits to JNR facilities.

High-ranking representatives from railways and transport ministries in Burma, Ceylon, India, Indonesia, Lebanon, Malaya, Pakistan, the Philippines, Taiwan, Thailand, Turkey, and the United Arab Republic (Syria) are expected to attend the conference, which will be headquartered at the Imperial Hotel.

In addition to the Tokyo activities, visits have been scheduled to Nikko, Kyoto, Osaka, and Hakone, where the conference will close.

Special features of the conference will include an exhibition of railway equipment and rolling stock, and a visit to the JNR technical research institute. Entertainment and receptions have also been planned for several evenings during the conference.

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RAILWAY APPLIANCES

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1 **B-18 Type Buffer** widely used in cars, coaches and locomotives where side buffers are required.

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2 **A-120-P Draft Gear** used in combination with B-18 type buffer where hook coupling is used, either with yoke application or with pull rod through the gear.

3 **A-22-SAXL Draft Gear.** Thousands have been applied throughout the world where center automatic couplers are used.

4 **RF-333 Draft Gear.** A combination rubber-friction draft gear providing maximum shock protection in a 24⅝" gear pocket.

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RESUME

MATERIEL FERROVIAIRE

1. Tampon Type B–18: employé pour wagons, voitures et locomotives exigeant des tampons latéraux.

2. Engrenage de Traction A–120–P: utilisé en combinaison avec le tampon Type B–18 pour les attelages à crochet, avec application de chape ou tirant traversant l'engrenage.

3. Engrenage de Traction A–22–SAXL: utilisé partout pour attelages automatiques centraux.

4. Engrenage de Traction RF–333: une combinaison d'engrenage de traction à friction en caoutchouc, dans une poche d'engrenage de 24 5/8", donnant une protection maximum contre les chocs.

RESUMEE

EISENBAHNMATERIAL

1. Typ B–18 Puffer: wird vielfach auf Güter-und Personenwagen und Lokomotiven verwendet, die Seitenpuffer erfordern.

2. A–120–P Zuggetriebe: wird mit dem Typ B–18 Puffer verwendet, wo Hakenkupplungen entweder mit Gabelgelenk oder mit Zugstange durch das Getriebe gebraucht werden.

3. A–22–SAXL Zuggetriebe. Diese Getriebe werden für automatische Zentralkupplungen verwendet.

4. RF–333 Zuggetriebe: Ein kombiniertes Gummi-Reibung Zuggetriebe in einer 24 5/8" Getriebetasche, mit maximalem Schutz gegen Stösse.

RESUMEN

ARTICULOS FERROVIARIOS

1. Paragolpes Tipo B–18 extensamente usado en vagones, coches y locomotoras cuando se requieran topes laterales.

2. Tren de tracción A–120–P, usado en combinación con el tope B–18 en los enganches de gancho, ya sea con yugo o con barra tractora a través.

3. Tren de tracción A–22–SAXL. Usados a millares en el mundo entero con uniones centrales automáticas.

4. Tren de tracción RF–333. Tipo combinado de fricción y caucho, con el máximo de protección contra impacto en un asiento de 24–5/8".

W. H. MINER INC.

WORLD POLL CONTINUED

THE MANILA RAILROAD COMPANY

Total: P 35,765,000*

Locomotives	P 5,884,000
Passenger cars	P 935,000
Freight cars	P 466,000
Total rolling stock	P 7,285,000
New line construction	P 22,800,000
Major improvements	P 600,000
Signalling	P 1,000,000
Communications	P 335,000
Yards and terminals	P 720,000
Shops and repair facilities	P 200,000
Other improvements	P 2,825,000
Total other expenditures	P 28,480,000

* 100 P = **$ 50.00** U.S.

IRAQI REPUBLICAN RAILWAYS

Total: 814,000 Dinar*

Locomotives	500,000 Dinar
Total rolling stock	500,000 Dinar
Major improvements	154,000 Dinar
New stations	160,000 Dinar
Total other expenditures	314,000 Dinar

* 100 Dinar = **$ 280** U.S.

GREEK STATE RAILWAYS

Total: 104,400,000 Drachmas *

Locomotives	7,000,000
Diesel railcars	12,000,000
Passenger cars	3,000,000
Freight cars and containers	2,000,000
Total rolling stock	24,000,000
New line construction	55,000,000
Major track improvements	24,400,000
Container delivery equipment	1,000,000
Total other expenditures	80,400,000

* 100 Drachmas = **$ 3.33** U.S.

●

Many of the world's major railway systems have not yet completed plans for capital expenditures during 1961. In some cases fiscal years do not commence until spring or mid-summer; in others, spending plans will not be made available for publication until after they have been finally approved by national or state legislative bodies.

As railways move to meet a growing demand for their services, improvement budgets for the coming year will reflect large investments in the modernization of physical plant. Dieselization and electrification, new construction and modernization of permanent way will account for substantial spending.

In coming months International Railway Journal will continue to publish spending plans of the world's major railway systems as they are made available.

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1 JACKSON TRACK MAINTAINER

For both putting up and maintaining track of finest, longest-lasting quality at minimum cost, this is the finest tamping machine money will buy. Powerful vibratory action and complete push-button control make it exceedingly fast. It's overwhelmingly first choice of U.S.A. railways. Available in U.S.A. standard and wider gauges.

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A complete tamping machine ideal for spotting and smoothing, secondary programs and all yard track maintenance. Utilizes powerful "Maintainer" tamping units. Traveling, indexing and workhead are all hydraulically controlled. All standard gauges.

4 JACKSON HAND TAMPERS

Vibratory-electric . . . operated from portable power plant serving 4 tampers. Universally used in low lift and smoothing work as well as major ballast insertion operations. Adjustable handles and interchangeable tamping blades make them quickly adaptable to all workers and tamping requirements.

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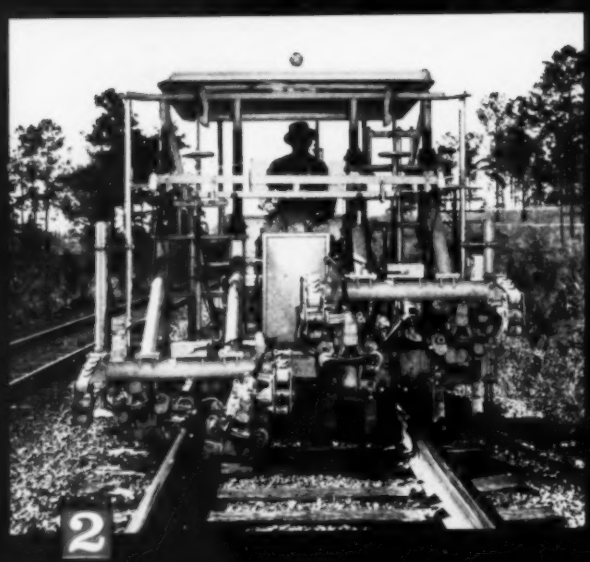

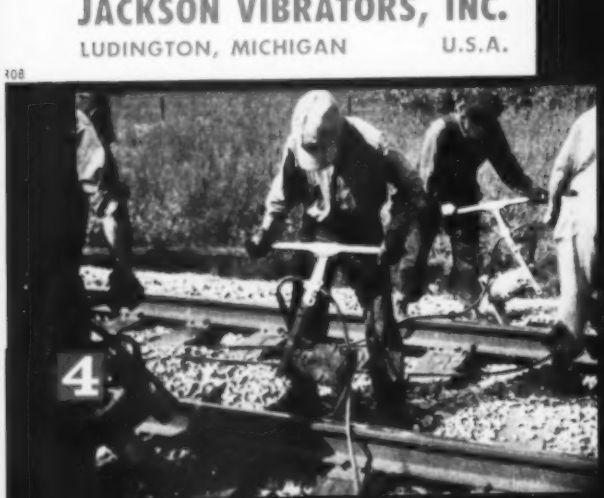

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Action vibrante à grande capacité. Service complet par appui sur bouton. Meilleure machine pour la pose et l'entretien des rails. Choix excessive des chemins de fer aux États Unis. Livrable en mesure de 4 foot 8½ inch et plus large (À transformer en mesure métrique).

2. JACKSON UNIVERSAL

Extrèmement pratique pour refouler des cailloux et fixer des traverses. Vérins et régulateur automatique de doubles traverses au choix. Service par appui sur bouton. Métre et mesures plus larges.

3. JACKSON MONORAIL

Machine à refouler complète, à fonctionnement hydraulique. Aussi excellente pour marquer, égaliser et entretenir l'emplacement des chemins de fer. Toutes mesures normales.

4. JACKSON REFOULEUR À MAIN

Vibrant-électrique, opéré d'une centrale électrique portable qui sert quatre refouleurs. Manettes et disques réglables pour buts divers.

1. JACKSON GLEISERHALTER

Leistungsfähige vibrierende Tätigkeit. Vollständige Druckknopfbedienung. Die beste Maschine zum anlegen und erhalten der Gleise. Überreiche Auswahl bei den Eisenbahnen der Vereinigten Staaten. Lieferbar im Mass von 4 Foot 8½ Inch und breiter. (Umzustellen in Metermass).

2. JACKSON UNIVERSAL

Besonders zweckmässig für feststampfen von Steinen, bevestigen von Schwellen. Hebewinde und automatischer Doppelschwellenregulator nach Wahl. Druckknopfbedienung. Meter und grössere Masse.

3. JACKSON MONORAIL (eingleisig)

Eine vollständige hydraulische Stampfmaschine. Auch besonders geeignet für markeiren, ebnen und erhalten des Bahngeländes. Alle Normalmasse.

4. JACKSON HANDSTAMPFER

Vibrierend-elektrisch, geleitet von tragbarer Kraftzentrale, die vier Stampfer bedient. Umstellbare Hebel und Scheiben für verschiedene Zwecke.

1. MANTENEDORA DE VIAS JACKSON

Intensa acción vibratoria. Sistema completo de botones para los mandos. La mejor máquina para la instalación y el mantenimiento de las vías, preferida por la inmensa mayoría de los ferrocarriles norteamericanos. Puede obtenerse en anchos de 143.5 cm o mayores.

2. JACKSON UNIVERSAL

De extraoridinaria eficiencia para el apisonado en general y de traviesas salientes. El equipo opcional incluye gatos y espaciador automático de doble traviesa. Accionada por botones. Para anchos de vía de un metro o mayores.

3. MONORRIEL JACKSON

Máquina apisonadora de funcionamiento totalmente hidráulico . . . Ideal también para nivelaciones, rasanteado y mantenimiento de las vías de patios. Para todos los anchos de vía standard.

4. APISONADORAS DE MANO JACKSON

Del tipo vibratorio-eléctrico, accionadas por una planta portátil que alimenta cuatro apisonadoras. El mango y las hojas se pueden ajustar para distintas aplicaciones.

JACKSON VIBRATORS Inc.

A Prototype and a Promise

There is a ferment of transportation development all over the world. But only part of the expansion in transportation is in the railway sector. In many countries the bulk of the capital being invested in transportation is going into highways, airports and water transportation facilities.

These other modes of transportation are useful and necessary —but for each country to get the most for its people from its expenditures on transportation, funds for transportation development must be divided to accord with relative economic values. The superior economic performance of railways—more transportation service (passenger-kilometers and ton-kilometers) at least cost—needs to be more generally understood and repeatedly acclaimed.

It is at this juncture in the history of transportation that *International Railway Journal* is being launched. Its purpose is to make widely available to all railroaders, wherever they may be, the information from all parts of the world which will help them to make railroad transportation more and more economical, and more serviceable to the public.

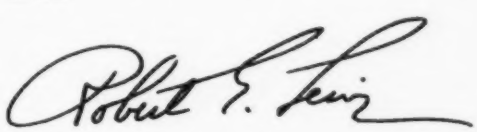
There already exists intensive international interchange of information in the fields of highway and air transport. The interchange in air transport is so effective and so rapid that improvements developed in one nation are quickly extended to all others. Indeed, if one visits a modern airport anywhere today there is practically nothing that meets the eye to distinguish it from a modern airport in any other country. Almost the same rapid spread of innovation is observable in the development of heavy-duty highways.

Up until now, however, improvements in the quality and economy of railway methods and technology have traversed international and intercontinental borders much more slowly and less surely. To hold their own, in competition with other methods of transportation, railway administrations and professional railroaders everywhere need a more rapid world-wide service of intercommunication. It is *International Railway Journal's* purpose to fill this need.

This issue of *International Railway Journal* is, frankly, a "pilot issue"—indicating the international course we have charted for ourselves. But we cannot claim that this issue is typical of the high standards of practical reporting we expect to attain in our first "regular" issue (January, 1961); and to maintain and improve upon each issue thereafter. Like the first diesel locomotive—this issue is a prototype—suggesting (we hope) the excellencies to come, but not yet embodying all of them.

Railroaders—as well as the manufacturers of materials and equipment used in providing railroad transportation—are, in a sense, competing with all other types of transportation and their suppliers. This competition should be friendly, but it is none the less real. And the future of railroaders and railway suppliers largely depends upon the relative excellency of their performance. It is the purpose of *International Railway Journal* to contribute as effectively as it can to the attainment of that excellence.

The arts and sciences should not be restrained by international or intercontinental boundaries. Railroading is both a science and an art.



Publisher

The Diesel Debate: Hydraulic's P

There can be little doubt that in the field of diesel-hydraulic locomotive development, especially as applied to high-horsepower units, one nation—Germany—stands in the forefront of the field.

Birthplace of both the fluid coupling and the hydraulic torque converter—both invented, ironically, by an electrical engineer, Fottinger—Germany at the outset of World War II had perhaps more operating experience with diesel-hydraulic railway equipment than any other nation.

In the prewar years, however, hydraulic transmissions were used almost exclusively in self-propelled railcars and trainsets. When the German Federal Railways, in 1948, made the decision to standardize exclusively on hydraulic drive for locomotives of all classes, many regarded the decision as a revolutionary one. What considerations led to the decision, and what have been the practical results?

In a paper read earlier this year in the U.S., before the mechanical division of the Association of American Railroads, Dr. Guenther Wiens of the German Federal's mechanical equipment department gave some of the answers.

"The hydraulic transmission has been considered first choice not only for use in railcars, but also increasingly for high-power diesel locomotives on account of

...Or Electric Traction's Proven R

How do the adherents of the diesel-electric view the rising acclaim for the hydraulic transmission? International Railway Journal asked General Electric—a firm with over 60 years' experience in the building of electrically-powered and electric-transmission railway cars and locomotives—for its view. Together with the views of other experts on railway and supply-industry staffs, the GE viewpoint provides an interesting counterpoint to that expressed above.

The diesel-electric, its adherents point out, has not only enjoyed a much longer history in railway traction than the hydraulic, but benefits from the experience of railway practice predating the diesel engine itself.

Foremost, perhaps, among the electric transmission's advantages is the most obvious one: the lack of mechanical connection between the diesel prime mover and the driving axle. In spite of the high state of development reached in the design and construction of cardan-shaft drives, mechanical stresses of a high order are inevitably present in any such drive. To accommodate such drives, mainline diesel-hydraulics require specially-designed bogie suspensions; bogies themselves must be designed and located to accommodate the drive.

By comparison, the electric transmission —with only flexible electrical connections required—permits the use of a simple,

ic's Promise

its low weight, its small space requirements and, last but not least, on account of its initial cost that is substantially lower than the cost of comparable electric equipment. This decision was also prompted by the extremely happy experience with this type of transmission. These hydraulic transmissions have a proven record of robustness in design, of simplicity of control, and of requiring little maintenance."

The availability of maximum tractive effort, Dr. Wiens said, was a major factor in the choice of transmissions. The inherent design of the hydraulic transmission permits maximum starting tractive effort at a standstill for a virtually unlimited time, and full diesel-engine output even at very low speeds. Tests conducted by the DB have demonstrated these advantages dramatically, by allowing a diesel-hydraulic switching engine to run under full load against a bumper for as long as desired, without risk or damage to the locomotive.

CONTINUED

ver Record?

rugged centerpin bogie, and allows the disposition of bogies and driving axles in virtually any arrangement dictated by operating conditions.

Even more important, in the view of electric-transmission supporters, is the fact that in the electric transmission high torque loads are present only where required—at the driving axle.

The simple gear-and-pinion drive of the axle-suspended traction motor concentrates mechanical stress on simple components which can be designed with exceptionally high factors of safety and low wear.

In contrast to the two simple gears per axle required by the diesel-electric, the diesel-hydraulic requires not only the right-angle gearing of the driven axle itself, but additional gearing and numerous universal joints—all subject to severe stress and consequent danger of fatigue and wear. These disadvantages can, it is true, be offset in lower-speed shunting locomotives by the use of side-rod drive and rigid-frame construction, but only at

CONTINUED

Diesel-Hydraulic vs. Diesel Electric

In the last fifteen years a motive-power revolution has taken place, and the steam locomotive is being shouldered aisde by newer forms of traction. Although electric traction has increasing support, and its technology is highly developed, the diesel has taken the commanding lead in terms of numbers. In diesel traction two methods of power transmission—electric and hydraulic—have reached high levels of development. How do the two compare? What are the advantages of each—in cost, in fuel consumption, in maintenance and availability? On these pages International Railway Journal presents, side by side, some of the arguments.

Traction hydraulique ou électrique?

Durant les quinze dernières années il s'est accompli une révolution dans le domaine de la force motrice: la locomotive à vapeur se voit de plus en plus évincée par des formes de traction plus modernes. Quoique la préférence aille de plus en plus à la traction électrique, dont la technologie s'est fortement développée, il faut constater que par rapport au nombre, le diesel se trouve en tête. Dans la traction diesel, deux méthodes de transmission de force—électrique et hydraulique—ont atteint un haut degré de perfectionnement. Comment se comparent-elles? Quels sont les avantages de chacune d'elles—en coût, en combustible, en entretien et en disponicilités?

Le INTERNATIONAL RAILWAY JOURNAL présente, dans ces pages, une confrontation de quelques-uns des arguments.

International Railway Journal Octobre 1960 p. 68

Hydraulische oder elektrische Triebwerke?

In den letzten fünfzehn Jahren hat auf dem Gebiet der Eisenbahntriebfahrzeuge eine Umwälzung stattgefunden. Die Dampflokomotive wird von neueren Zugförderungarten verdrängt. Wenn auch die elektrische Zugförderung laufend mehr befürwortet wird und technisch hoch entwickelt ist, so liegt doch das Dieseltriebfahrzeug zahlenmäßig in Führung. Für Dieseltriebfahrzeuge haben zwei Arten der Kraftübertragung—elektrische und hydraulische—einen hohen Entwicklungsstand erreicht. Wie sieht ein Vergleich aus? Welche Vorteile hat jede hinsichtlich der Beschaffungskosten, Unterhaltung, Einsatzbereitschaft und des Kraftstoffverbrauches?

International Railway Journal bringt auf diesen Seiten eine Gegenüberstellung einiger der angeführten Gründe.

International Railway Journal Oktober 1960 S. 68

¿Tracción hydráulica o eléctrica?

Durante los últimos de 15 anos una revolución se ha realizado en el terreno de la fuerza motriz. La locomotora a vapor se iba suplantando por nuevas formas de tracción. Aunque se prefiere más y más la tracción eléctrica, cuya tecnología se ha desarrallado en alto grado, la traccion Diesel adelanta. En la traccion Diesel, dos métodos de transmisión—eléctrica e hidraulica—están en un alto nivel de desarrollo. Importa comparar las dos, las ventajas de cada una, los gastos de combustible, de entretenimiento, la disponibilidad. En estas páginas INTÉRNATIONAL RAILWAY JOURNAL presenta una sinopsis.

International Railway Journal Octubre 1960 p. 68

DIESEL–HYDRAULIC CONTINUED

High Horsepower-to-Weight Ratio is Outstanding Featu of

Freedom from wheel-slip on grades or when starting is another major advantage of the diesel-hydraulic. Because of the nature of the transmission, slippage automatically causes the torque to drop rapidly and restore the balance between tractive and adhesion forces—in effect stopping slippage at its outset.

The advantages are most apparent in preventing single-axle slip, which is made impossible by the mechanical coupling of all axles on the drive truck, or even on the entire locomotive. Diesel-electric locomotives with individual-axle traction-motor drive, on the other hand, require costly and complex anti-slip equipment to prevent the burnout of traction motors.

Another advantage claimed for the diesel-hydraulic is its weight distribution. In contrast with the high unsprung weights involved in the nose-suspended traction motor, only part of the axle drive contributes to unsprung weight in a hydraulic locomotive; the small weights carried on the truck also reduce inertial moment in respect to axis rotation, contributing to improved riding qualities.

The reduction of total locomotive weight made possible by the hydraulic transmission is regarded as vital by the DB, as high fuel prices and limited maximum axle loads place a premium on high horsepower in relation to total locomotive weight.

Replying to a frequent criticism of the hydraulic transmission in locomotive use—the necessity for a mechanical drive, carrying high torque, between the transmission and the axles— Dr. Wiens admitted "teething troubles" with early transmissions, but blamed the difficulty on inexperience in manufacture rather than inherent weakness of design. Increased machining accuracy, proper welding techniques with x-ray inspection, and exact balancing have produced cardan-shaft drives that produce very little trouble in actual service, he said. Present practice on the DB calls for over 300,000 kms. of operation between inspections of cardan shafts. The cardan-shaft drive is used on all DB diesel hydraulics except the standard 650-h.p. switching locomotive; here, because of the heavy-duty, low-speed operation, side-rod drive is employed.

A major feature of the German Federal's motive-power program is the provision for a minimum number of standard designs for all classes of services. This program has so far resulted in the development of five standard locomotive classes for diesel traction, ranging from 650 to 4000 horsepower.

An added factor in this program is the provision for maximum interchangeability of major components within each class. Installation dimensions of diesel engines manufactured by all three suppliers—Daimler-Benz, MAN, and Maybach—are the same for each class, making possible free interchange of engines and reducing time out of service for engine maintenance.

DIESEL–ELECTRIC CONTINUED

The Diesel-Electric's Strong Points: Simplicity of Desig and

the cost of dynamic augment and increased lateral rail stress.

The use of coupled driving axles—necessary in the diesel-hydraulic—provides certain advantages in the utilization of tractive effort and the elimination of wheel-slip. At the same time, however, additional problems are created. Even small differences in wheel diameter, occasioned by wear in service, set up continuing strains in the mechanical coupling—strains which can be most severe where cardan-shaft coupling is employed.

In any case, where operational requirements dictate the use of coupled axles the electrical transmission is readily adaptable to such coupling, either with cardan shafts, side rods, or other means.

While the majority of diesel-electric locomotives built have employed the simple nose-suspended traction motor, special conditions requiring the reduction of unsprung weight can be met by the use of quill drives and similar methods. In more extreme cases traction motors can be, and have been, frame-mounted with cardan-shaft drive to the driving axles. While the mechanical complexity of the drive is compounded by either of these remedies, the resulting drive is still more rugged and less subject to wear and fatigue than a continuous cardan-shaft drive from transmission to axle.

Ease of control remains a strong point of the diesel electric. Electrical switching of traction-motor connections into series, series-parallel, and full-parallel groupings gives a simple, entirely non-mechanical method of providing speed and torque ranges suited to differing operating conditions.

Dynamic braking—of great value under high-tonnage operating conditions—is readily and simply available with the electric transmission. Dynamic braking of diesel-hydraulic locomotives, though promising, remains in the early experimental stages.

In the area of available adhesion—a central issue in the current hydraulic-electric debate—recent tests indicate that the gap between the two transmissions may be less dramatic than has been claimed. In these tests diesel-electric locomotives regularly developed over 50% starting adhesion, and electrical-transmission units have maintained 30% adhesion at maximum speeds permitted by available horsepower.

In the view of the electric transmission's advocates, operating experience has demonstrated that running-gear design—an area where the electric transmission provides maximum flexibility—and track condition are far more important in determining adhesion characteristics than the type of transmission employed.

In one field especially—the handling of heavy tonnages on severe grades and over long runs—the diesel-electric has a proven record of performance: North American railways, for example, handle one ton per horsepower in freight service

of Hydraulics

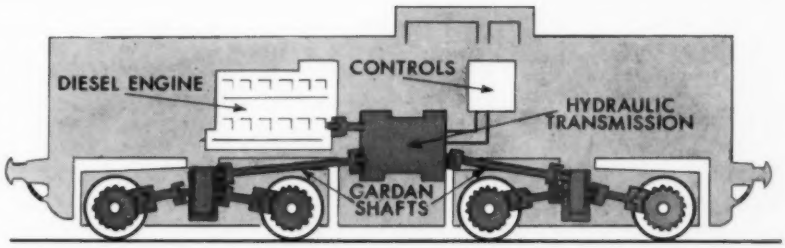
In the V-200 standard mainline locomotive (2200 or 2400 h.p.) this interchangeability is carried one step further. Two different transmissions are employed in these locomotives—the Voith transmission, using a three-stage torque converter in which operating ranges are changed by successive filling and emptying of the three chambers, and the Mekydro transmission, which uses a single-stage converter with an automatic gear-changing drive on the output side. Specifications, however, are such that either type of transmission may be readily installed in any V-200 locomotive unit.

While the DB has to date committed itself to the hydraulic transmission for diesel locomotives, developments in electric transmission are being closely watched.

Further research is also being conducted into the operation and design of diesel-hydraulic power. Particular attention is being given to hydro-dynamic braking, and the six 4000-h.p. Krauss-Maffei hydraulics now building for U.S. roads will incorporate newly-designed vortex braking in the hydraulic system.

Continuing attention is also being given to the design of hydraulic transmissions with a minimum of gears, to reduce wear and maintenance problems. One design, which will also be incorporated in the U.S. locomotives, is built by Voith, and will use only a step-up gear between the engine shaft and the converter input shaft.

With the application of hydraulic drive to mainline diesel locomotives of constantly increasing size, speed and horsepower attracting considerable attention throughout the world, Germany is leading the field, and the German Federal is well satisfied with its own hydraulics.



Hydraulic has low weight; cardan-shaft drive is subject to high torque, wear.
L'hydraulique a un poids réduit; cet entraînement provoque usure et torsion élevées.
Hydraulische Anlage ist leichter; der Antrieb unterliegt höherem Drehmoment, starker Abnutzung.
La instalación hidráulica tiene peso menor, la transmisión sujeta a torsión mas grande.

and Flexibility

in reasonably level territory; one Canadian iron-ore line handles 16000-ton trains with four diesel-electric units totalling 7200 h.p.

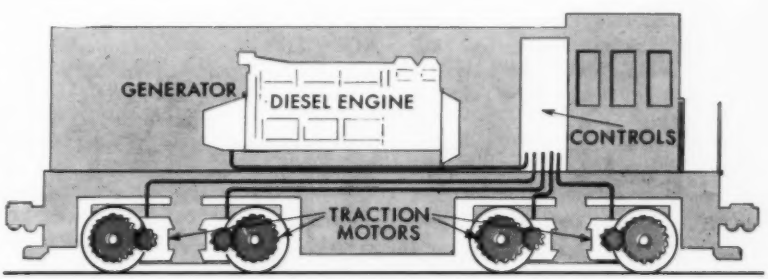
Electric-transmission partisans further point out that the high horsepower-to-weight ratio of recent hydraulics may not be the advantage it seems at first glance. In support of this argument, they point out that to make full use of such high horsepower at the relatively low speeds encountered in freight service, additional ballasting of locomotive units would be required, offsetting the advantages obtained in reduced weight of transmission components.

Recent developments in traction-motor insulation have also eliminated to a large extent the danger of burnout caused by wheel slip. These motors can develop sufficient torque to slip the wheels on a locomotive with normal axle loading without danger of thermal failure, even under continuous operation.

The electric transmission likewise lends itself admirably to the standardization of components. Different combinations of the same traction motor can be used in locomotives of widely differing horsepower ratings, and most control components can also be arranged to handle these widely varying power requirements.

While the diesel-hydraulic locomotive of high horsepower has aroused the interest of railway men throughout the world, and has presented a serious challenge to the older diesel-electric, the electric transmission has many vocal and well-informed adherents.

They place their reliance on simplicity of design and flexibility, and their position is backed by many years of successful experience.



Diesel-electric has simplicity of design, higher gross and unsprung weight.
Le diesel électrique est d'une conception simple; poids brut et non suspendu plus élevé.
Die dieselelektrische Anlage ist einfach; ihr Bruttogewicht und unabgefederten Massen höher.
La locomotora dieseleléctrica es simple; el peso bruto y no suspendido más grande.

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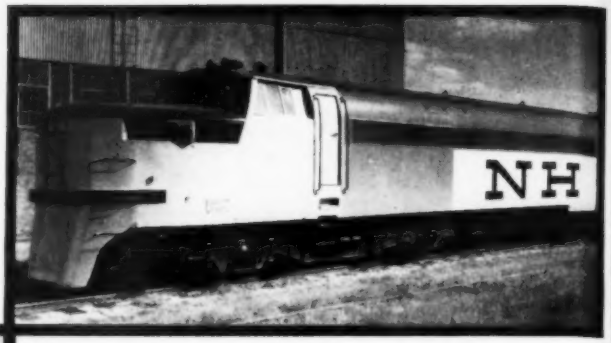

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Israel: Railways Gear for Growth

How does an improvement in one sector of a nation's economy affect its railway system?

With the beginning of construction work for a completely new port at Ashdod, 40 km south of Jaffa, that question is being faced now by the railway system of Israel.

The new seaport, located on the site of a port that flourished during biblical times, will serve a vital function in the growth of Israel's economy. When operations begin in 1965, Ashdod will handle a large part of Israel's important citrus export traffic.

Phosphate from the Negev and potash from the Dead Sea area will contribute to a steady increase in port traffic as facilities are brought into use, and planners expect Ashdod to rival Haifa—now Israel's principal seaport—in tonnage by 1975.

Ashdod will be largely a railway port. Marshalling yards and shipside spurs have been provided in the plans, and a large part of Ashdod's export and import traHc will move by train.

During construction, too, Ashdod is expected to contribute considerable traffic to the Israel Railways; rail shipment is planned for a large part of the materials needed, especially rock fill for the extensive breakwaters required.

The long-term effect of Ashdod on railway traffic and revenues is not so clear. Most of the commodities to be handled by the new port are produced in the southern part of the country. Where citrus and minerals now move by rail to Haifa, the opening of the port will reduce the average length of haul for much of the traffic by one third to three fourths. The loss of revenue, at present freight volumes, has been estimated at two million Israeli pounds ($1.12 million U.S.), approximately 30 per cent of present freight revenues.

On the other hand, government plans for a greatly increased industrial output during the next five years may well offset this loss in revenue from shorter hauls.

A key to the future economic relationship between port and railway system may well be the fact that the future of both—and indeed of the entire Israeli economy—are closely tied to the same goal: the economic development of the southern part of the nation.

The development of mineral resources and the expansion of population will require expansion of transport facilities in the area. Rail facilities have been planned for some time, and the program under study contemplates the building of lines from Beersheba to Dimona, 35 km; Dimona-Oron (phosphate mines), 27 km; and Sdom (Dead Sea) to Eilat on the Gulf of Aqaba, 190 km.

The hostilities between Israel and the United Arab Republic, resulting in the closure of the Suez canal to Israeli cargos, and a strong desire to increase trade with East Africa and other Indian Ocean areas make the development of transport facilities between the north and Eilat of even greater importance.

The completion of all or a part of these lines could well bring greatly increased traffic to both the railways and the new port. The first of the lines, Beersheba to Dimona, is already under construction, and expected to be in operation next year.

The physical plant of the Israel Railways has also been modernized to meet future needs; the line is completely dieselized, with 35 mainline and shunting locomotives of U.S. and German manufacture and 56 German-built railcars and railcar trailers. All road locomotives and three of the railcars are equipped with two-way radio, and planned extension of the network will make possible the use of radio for train dispatching.

Although there appears to be a considerable lack of coordination between agencies responsible for meeting Israel's transport needs (the government-owned trucking company, for example, is under the jurisdiction not of the Ministry of Transport but of the Ministry of Development), the railway management has established a five-year plan of progress to be completed by 1965. During the next two years the railway hopes to reach an annual volume of 2.5 million tons and 5.5. million passengers (compared with approximately 1.7 million tons and 4.7 million passengers in the fiscal year 1958-59).

In addition to the Beersheba-Dimona and Dimona-Oron extensions, the plan contemplates considerable improvement of existing track and facilities, and the addition of five diesel locomotives, 29 passenger cars, and about 150 new freight cars.

Although rapid economic growth has produced difficulties for the nation's railway system, and though the new port of Ashdod may well produce temporary reverses, it is clear that the nation regards its railways as an essential ingredient of a modern economy, and equally clear that the Israel Railways intend to meet the challenges head-on.

World Bank Lists Rail Loans

Transportation projects accounted for the largest single portion of the loans granted during fiscal year 1959-60 by the International Bank for Reconstruction and Development (World Bank), according to the bank's fifteenth annual report, issued September 27. Railways were an important factor in the year's transportation loans.

Altogether, the equivalent of $245 million U.S. was loaned for transportation, and of this amount $62.5 million was earmarked for railways. Loans for specific railway purposes, however, tell only part of the story. Two important loans outside the transportation category, totalling $81.5 million, involved important railway projects.

The biggest single railway project, in terms of construction, to be financed by the bank during the year was the projected 675-km standard-gauge line from Fort Gouraud to Port Etienne in the Islamic Republic of Mauretania in northwest Africa.

The line, to be built by Société Anonyme des Mines de Fer de Mauritanie (MIFERMA), is part of an iron-ore development project which will provide tremendous economic impetus to a nation whose natural conditions severely limit development.

Construction problems presented by the desert area to be crossed by the MIFERMA railway make the project of unusual interest. Two veritable rivers of sand—the Azéfal and the Akchar—must be crossed by the rail line for a total distance of approximately 80 km.

Fifty-four-kg rails will be used, welded into lengths of up to 100 km, and grades will be .5 per cent for loaded trains, one per cent for empties.

The unpopulated country to be traversed will make necessary unusual operating methods; the 14,000-ton ore trains will carry six men; the operating crews for the 133-car trains will consist of only three men, with a crew change midway, but off-duty crews will travel with the train.

A total of 600 ore cars of 75-ton capacity, designed for rotary dumping, are planned, and the 20 mainline diesel-electric locomotives will be operated in multiples of three or four.

An additional 80 to 100 service and miscellaneous cars are contemplated, as well as six diesel shunting engines. Because of the extremely high temperatures to be encountered, locomotive cabs and crew cars or cabooses will be air conditioned.

Another important loan, made primarily for other than transportation needs, that will involve railway construction was made to the Republic of Sudan in June to help complete the Managil Irrigation Scheme between the Blue Nile and the White Nile south of Khartoum. In addition to some 260 km of main irrigation canals and a water-distribution network covering several thousand kilometers, the financing will provide for the building of 225 km of light railway line serving the newly-irrigated area, and assist in the purchase of 60 diesel locomotives and 900 freight cars for the light-railway network.

Early in the bank's fiscal year two important loans were made to continue railway programs of India and Pakistan. In July, 1959, a loan equivalent to $50 million to India provided foreign exchange requirements for the fourth year of India's second five-year program. (See "World Report", page 7, for more recent Indian Railways plans and financing.)

A loan of $12.5 million to Pakistan in November, 1959, provided interim requirements while a full-scale railway program for Pakistan's second five-year plan were being formulated.

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Brazil: New Hope for Railways

To arouse public interest in their country's railroads, a group of engineers have organized a technical committee designated as the Brazilian Railroad Association ("Associação Ferroviária Brasileira").

Purpose of the new association is "to help raise Brazilian railroad systems to a degree of efficiency consistent with the country's economic growth." Its organization has been saluted by the Brazilian railway publication, Revista Ferroviária, as marking "an incipient reaction in the engineering world against the way in which, for many years, all questions affecting the railroads have been handled—or rather neglected."

The "Associação Ferroviária Brasileira" was formed at the Engineers' Club in Rio de Janeiro following a series of discussions and debates about the causes of deficits incurred by the Brazilian railroads (Rede Ferroviária Federal, S. A.). Engineers and economists from the cities of Sao Paulo and Belo Horizonte also participated in the special committee talks which led to organization of the association. Revista Ferroviária says its formation indicates "a degree of interest no longer expected in railroad problems."

Brazil, the association's founders point out, is a vast country, covering more than 8.5 million square kilometers. It is rich in natural resources, but many parts of it are not yet fully developed economically. Under those circumstances, railroads serve a vital function as its principal form of inland transportation. Association organizers apparently believe the country's railroads can best fulfill that role by operating as an interconnected system, using the same gage of track. They would also like to see the railroads adopt standardized operating rules; interchangeable rolling stock, brake and coupling systems; and uniform signaling and communications methods.

To help bring about those results, and to strengthen the railroads in other ways as well, the new Railroad Association says it hopes:

- To cooperate closely with railroad managements, especially in perfecting methods of operation.
- To collaborate with the railroad administration in learning about and applying new techniques which hold out promise of improving railway transportation.
- To undertake and encourage technical and scientific research, and the study of railroad problems, or of matters of interest to railroads.
- To exchange information on railroad affairs, both within Brazil and between Brazil and other countries.
- To stimulate general public interest in, and public knowledge of, railroad problems, through organized publicity and education, including promotion of railroad publications, meetings and conferences.
- To protect and develop Brazil's railroad equipment manufacturing industry.
- To promote legislation or other official government action designed to improve rail transportation.
- To create national awareness of the need for efficient railway service as a fundamental requirement for the future progress and economic development of the nation.
- To arouse among railway men themselves a desire to cooperate in developing and perfecting rail transportation.

The executive board of the association includes Engineers Jerónimo Monteiro Filho, president; Ismael Coelho de Souza, Waldemar Luz, Francisco Paulo de Assis Figueiredo, Victório Ferraz, Jair Rêgo de Oliveira, Eduardo Beral Sardinha and Lauro Parente, vice presidents; Paulo Meirelles Reis, secretary general; Hélio de Almeida and Edward John Grepp, first and second secretaries; and Paulo Castello Branco and Edgard Werneck, first and second treasurers.

Except in the vicinity of Rio de Janeiro and Sao Paulo, where there is a well-interconnected system, most Brazilian railways are confined to the coastal area, running inland only for relatively short distances from various seaports.

The total length of all railroads in the country is approximately 37,000 km. Of this total, about 25,000 km are owned and managed by the federal government; 3,800 km are owned by the federal government but operated by a state or by a private company, and 3,400 km are owned and managed by various states. The rest of the mileage is privately owned and operated under federal or state concessions. Approximately 2,000 km are electrified. About 90% of all lines are of meter gage; 7% are of 1.6-meter width. The remaining 3% include gages of 0.61 0.66 and 0.76 meters.

Une association pour aider les chemins de fer brésiliens

Afin d'intéresser les brésiliens à leur réseau ferré, un groupe d'ingénieurs a organisé un comité technique nommé: "Association des Chemins de fer Bresiliens" (Associação Ferroviária Brasileira).

Le but de cette nouvelle association est "d'aider le réseau brésilien à obtenir un rendement qui soit compatible avec l'expansion de l'économie nationale".

International Railway Journal Oct. 1960 p. 74

Verein zur Unterstützung d. brasilianischen Eisenbahn.

Um das Interesse des Publikums an den Eisenbahnen ihres Landes zu wecken, gründete eine Gruppe von Ingenieuren den technischen Ausschuss 'Brasilianischer Eisenbahnverein'. Zweck dieses neuen Vereins ist, 'dazu beizutragen, das brasilianische Eiesnbahnwesen auf einen Leistungsstand zu bringen, der mit dem wirtschaftlichen Wachstum des Landes im Einklang steht.'

International Railway Journal Okt. 1960 S. 74

Asociación pro fomento de los FFCC Brasileños

Con el fin de despertar el interés del público en los ferrocarriles de su país, un grupo de ingenieros brasileños ha organizado un comité técnico conocido con el nombre de Asociación Ferroviaria Brasileña.

El objetivo de esta nueva asociación es "ayudar a elevar los sistemas ferroviarios del Brasil hasta un nivel de eficiencia que se equipare al crecimiento económico de la nación".

International Railway Journal Oct. 1960 p. 74

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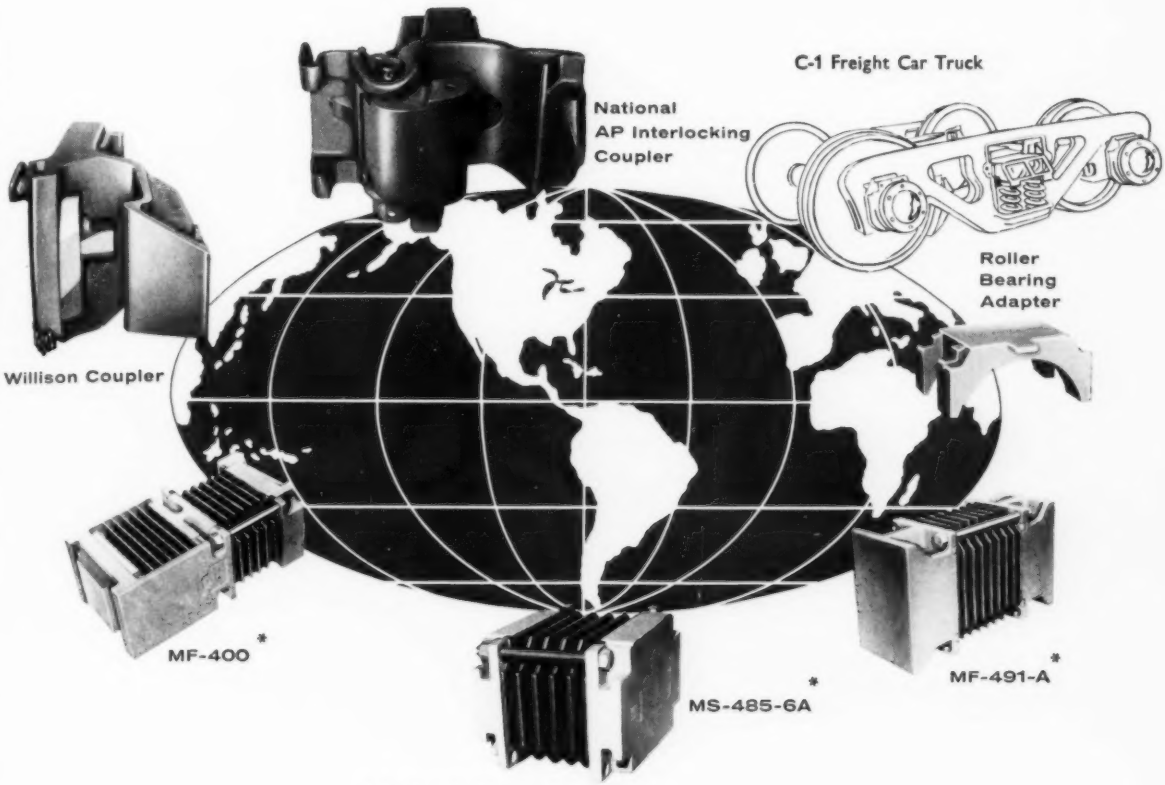

* Rubber draft gears

adapted to meet specific conditions:

With background of experience from serving transportation for OVER NINE decades...also with advent automatic couplers OVER 70 years ago...including knuckle and Willison automatic coupler types with or without interlocking and transition design features.

A-2892A

International Division Headquarters

NATIONAL
MALLEABLE AND STEEL
CASTINGS
COMPANY
Cleveland 6, Ohio

CURRENT FACTS ON TIMKEN "AP" BEARINGS

- Averaged 214,000,000 miles between car set outs caused by overheated bearings.

Une moyenne de 344.000 de km parcourus entre pannes de wagons dues à des coussinets surchauffés.

Corren un promedio de 344,326,000 kilómetros entre fallas del vagón debidas a cojinetes sobrecalentados.

Durchschnittlich 214.000.000 Meilen zwischen Absetzen von Wagen wegen Lagerueberheizung.

- Traveled 288,000 miles in high speed test without adding lubricant.

A parcouru 463.000 km au cours d'essais à grande vitesse, sans addition de lubrifiant.

Caminó 463,392 kilómetros en ensayo de alta velocidad sin adición de lubrificante.

Sie gingen 288.000 Meilen in einer Hochgeschwindigkeitsprobe ohne zusaetzliches Schmiermittel.

- 51% of all freight cars ordered in the U.S.A. this year are to be Timken bearing-equipped.

51% de tous les wagons de marchandises commandés aux Etats-Unis cette annee séront dotés de coussinets Timken.

El 51% de todos los vagones de carga ordenados en los E.U.A. este año han de estar dotados de cojinetes Timken.

51% von allen in den U.S.A. in diesem Jahr bestellten Frachtwagen sollen mit Timken Lager ausgestattet werden.

The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".

heavy duty TIMKEN®
tapered roller bearings

TIMKEN BEARINGS MANUFACTURED IN AUSTRALIA · BRAZIL · CANADA · ENGLAND · FRANCE AND U.S.A.